

# AMERICAN JOURNAL OF OPHTHALMOLOGY

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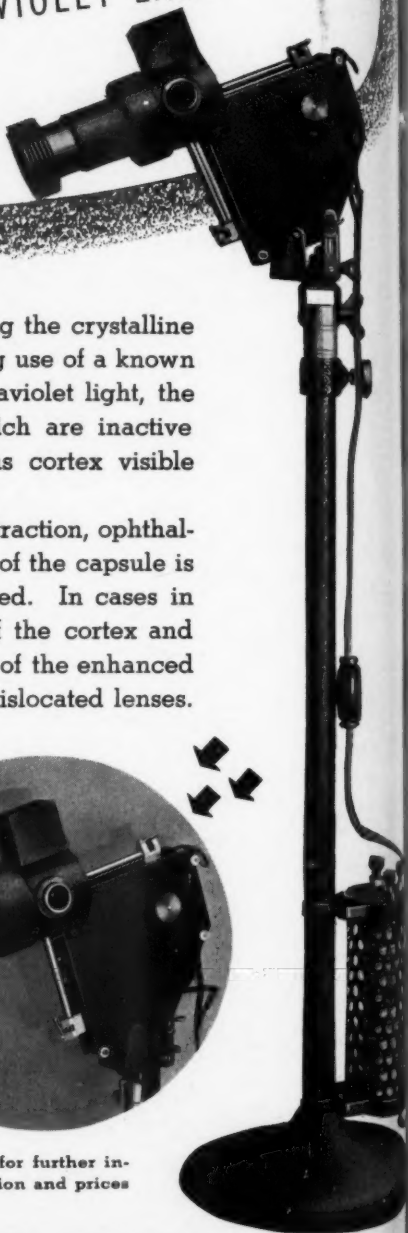
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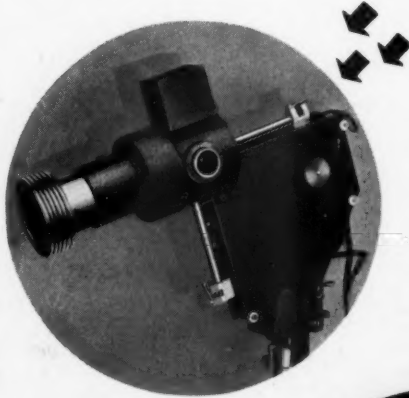


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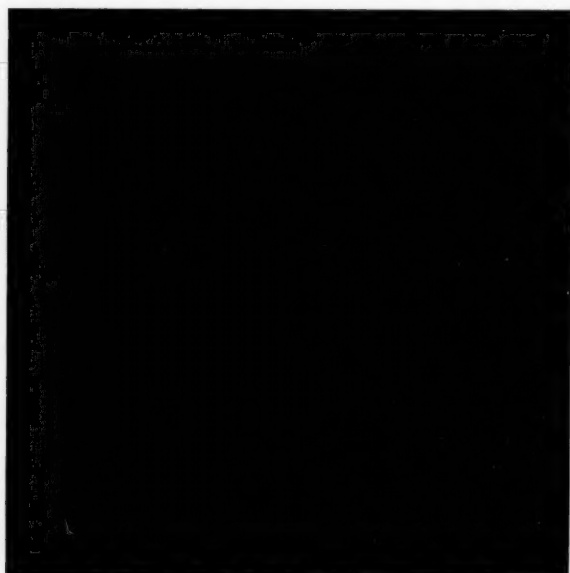


FIG. 1 (LEINFELDER AND KERR). OPHTHALMOSCOPIC APPEARANCE OF STATIONARY POSTERIOR POLAR CATARACT IN A RABBIT.



FIG. 2 (LEINFELDER AND KERR). LATE APPEARANCE OF THE LENS. RABBIT I-2.

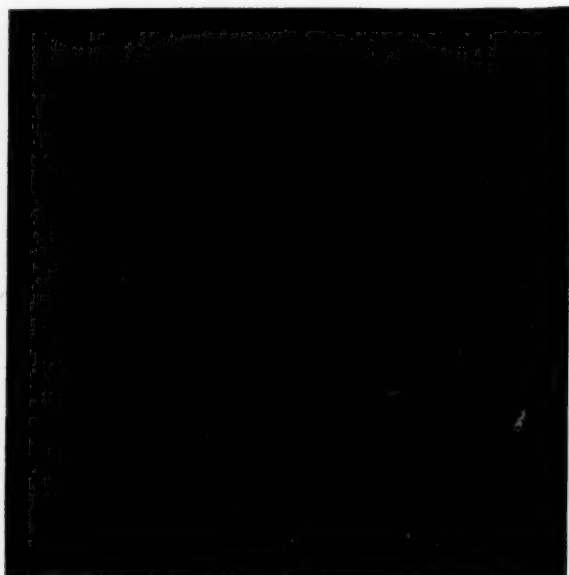


FIG. 3 (LEINFELDER AND KERR). OPHTHALMOSCOPIC APPEARANCE OF STATIONARY POSTERIOR POLAR OPACITIES RABBIT II-1.



FIG. 4 (LEINFELDER AND KERR). OPHTHALMOSCOPIC APPEARANCE OF POSTERIOR POLAR OPACITIES. CASE 2



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## ROENTGEN-RAY CATARACT

### An experimental, clinical, and microscopic study

P. J. LEINFELDER, M.D. AND H. D. KERR, M.D.

IOWA CITY, IOWA

The eyes of several groups of rabbits were exposed to various doses of roentgen rays. Observations were continued over a period of two-and-a-half years and showed that lens changes developed in all cases. The usual opacity which consisted of small punctate dots in the posterior polar region was not progressive.

Clinical observations were made on five patients who had received roentgen-ray therapy in the region of the eyes. Of these patients, two children developed cataracts two years after treatment, while the three adults showed no opacities up to thirty months following irradiation.

Microscopic examination was made of the rabbit lenses and of the lenses from four patients who had received roentgen-ray therapy in the ocular region. Histologic evidence of cataract, consisting of equatorial, posterior polar and anterior and posterior cortical changes, was present in all lenses. The study indicates that the crystalline lens will tolerate ordinary therapeutic doses of roentgen rays, especially when the available methods of shielding are used. From the Departments of Ophthalmology and Roentgenology, College of Medicine, University of Iowa. Read before the Association for Research in Ophthalmology, at Kansas City, Missouri, May 12, 1936.

### Part I

Confusion concerning the effects of the roentgen ray upon the lens has existed since 1897 when Chalupecky<sup>1</sup> noted anterior polar cataract in irradiated experimental animals. A few years later Birch-Hirschfeld<sup>2</sup> reported that the lens in man and animals remained clear following exposure to roentgen rays, but in 1904 he<sup>3</sup> noted that, after irradiation of the fetus *in utero* opacities developed in the lens. Von Hippel<sup>4</sup> found that cataract was more frequent in irradiated than in normal eyes of embryos. A succession of experiments by Bossuet,<sup>5</sup> Stock,<sup>6</sup> Birch-Hirschfeld,<sup>7</sup> Rados and Schinz,<sup>8</sup> Stumpf,<sup>9</sup> Jacoby,<sup>10</sup> Rohrschneider,<sup>11</sup> Aulamo,<sup>12</sup> and Gasteiger and Grauer,<sup>13</sup> because of conflicting results, did not entirely clarify the subject. The reports of numerous cases of cataract in human lenses following irradiation (Birch-Hirschfeld,<sup>14</sup> Paton,<sup>15</sup> Axenfeld,<sup>16</sup> Salzer,<sup>17</sup> Horay,<sup>18</sup> Dor,<sup>19</sup> Pfahler,<sup>20</sup> Salus,<sup>21</sup> Ziegler,<sup>22</sup> Ascher,<sup>23</sup> Scheerer,<sup>24</sup> Davids,<sup>25</sup> Rohrschneider,<sup>11</sup> Meesmann,<sup>26</sup> Stallard,<sup>27</sup> and Milner,<sup>28</sup>) confirmed the opinion that the lens was sensitive to roentgen rays and that

cataract was a likely result of irradiation. In some instances, however, the relationship between the cataract and roentgen-ray exposure was doubtful because of the advanced age of the patients. Many of the cases, nevertheless, appear to have been solely the result of the roentgen-ray irradiation. Partial cataract in human lenses was noted in eyes which had been protected by lead—Rohrschneider, Horay, and Meesmann—while in Paton's case the eye was shielded with rubber.

The dosages of roentgen rays described in the reported cases and in the experimental work are on the basis of skin-erythema doses (H.E.D.); yet this is not exact, for 100-percent H.E.D. may be given in a number of ways—as a massive dosage of the short or hard rays or a less intense dosage of the long or soft rays. Often the filtration is not stated, and no idea can be formed concerning the quality of the rays. In the experimental reports this omission makes it impossible to compare results with the effects of present-day therapy and the methods described seem to in-

dicating a desire to produce lens changes rather than to study the effect of usual therapeutic doses on the lens.

In an attempt to demonstrate the sensitivity of the lens to the ordinary therapeutic doses of roentgen rays, the following investigations were made: 1. In the first part of the study, roentgen irradiation similar to that used in the treatment of malignancies in the orbital region was given to a series of normal rabbits. 2. Observations of patients with malignancies in the ocular region who had been treated according to the principles of modern therapy and without consideration of possible damage to the lens. When possible, the eye adjacent to the lesion was not directly exposed to the rays, but in some cases protection was impracticable and the eye received full dosage. 3. Microscopic examinations of the irradiated animal and human lenses.

### Experimental

Experimental studies were made on five groups of rabbits. In each rabbit one eye was irradiated with roentgen rays while the opposite eye was completely shielded by 2 mm. of lead, and served as a control.

Group I. Three rabbits received, at three-day intervals, three treatments of 900 roentgens to one eye. The factors were 133 K.V., 5 ma., at 50 cm., with filtration by 1 mm. of aluminum. The total dosage for each animal in this group was 2700 roentgens in six days.

Group II. Three rabbits received in one eye the roentgen rays produced by 200 K.V., 5 ma., at a distance of 50 cm. and filtered through .5 mm. copper and 1.0 mm. aluminum. The dosage in the single treatment was 600 roentgens.

Group III. Three rabbits were treated 15 times in 22 days with 200 roentgens, produced by 200 K.V., 20 ma., at 50 cm., filtered with the Thoraeus\* plus 1 mm. aluminum.

Group IV. Three other rabbits were given 200 roentgens daily for 10 days, with 200 K.V., 6 ma., at a distance of 50 cm. and filtered by .5 mm. copper and 1.0 mm. aluminum. The total dosage was 2000 roentgens in 10 days.

\* Thoraeus filter = .4 mm. tin, .25 mm. copper, and 1.0 mm. aluminum.

Group V. Each of two rabbits was given a single exposure of roentgen rays produced by 90 K.V., 5 ma., at a distance of 37½ cm. No filter was used and the dosage was 1200 roentgens.

Observation of the rabbits was made at weekly intervals during the first three-and-a-half months. Later examinations were less frequent, varying from once every two weeks to once a month toward the end of the experimental period.

Conjunctivitis in the irradiated eye was the earliest manifestation of the activity of the roentgen rays. It was characterized by a purulent discharge and a red thickened palpebral conjunctiva. The duration of the inflammation was from a few days to four weeks. The fact that the inflammation was unilateral and in most instances affected each of the three rabbits in a group at the same time indicated that the roentgen rays were the etiologic agent.

In Group I, all three animals were affected. The inflammation began in the second week after the first treatment; it lasted about four weeks and was more protracted than in any of the other groups. In Group III, a slight transitory conjunctivitis developed. In one rabbit, reddening of the palpebral conjunctiva occurred on the 14th day after the first treatment, while in the others it was noted on the 22d day. The three rabbits in Group IV were observed to have a moderate conjunctivitis on the 15th day after the first treatment; no inflammation was present at the examination one week later. Both rabbits in Group V had a moderately severe conjunctivitis when examined on the 13th day after treatment; there was no evidence of inflammation on the 9th or 20th days. Group II showed no inflammation at any time.

Epilation occurred in varying degrees. The rabbits in Group I began to lose hair about the treated eye on the 38th day, and complete epilation had occurred on the 56th day. There was no epilation in Group II. In Group III it had begun on the 28th day, and on the 42d day had reached a maximum of 50 percent. Epilation of 20 percent occurred in 86 days over the treated area of the rabbits of Group IV. The rab-

bits of Group V showed the first signs of loss of hair on the 7th day and it was complete on the 56th day. In all the animals except those of Group V regrowth of hair occurred.

Changes in the lenses were observed in all irradiated eyes. The first ophthalmoscopic indication of cataract was the appearance of fine bubbles situated under the posterior capsule around the entire periphery of the lens. With passage of time the bubbles gradually increased in extent and covered most of the posterior subcapsular region. Later a horizontal aggregate of bubbles which developed at the posterior pole eventually contracted to a dense, irregular, linear opacity from which radiated rows of small vacuoles (fig. 1). The opacities remained posterior subcapsular during the entire course of observation. Anterior subcapsular opacities were rare. Slitlamp examination was not routine, but when utilized showed the usual appearance of posterior subcapsular cataract.

In Group I the posterior subcapsular opacities were noted in the periphery 62 days after the first treatment. An increase in extent of the opacity and fine anterior subcapsular opacities were observed on the 126th day. Progression was gradual and on the 160th day there was diffuse opacification by small bubbles in the entire posterior subcapsular region. This occurred in all three eyes, and in the two rabbits which lived the opacities progressed; under diffuse illumination the lenses appeared translucent but with the slitlamp minute opaque flocculi were observed in the cortex. The lens of rabbit no. 3 became opaque and remained unchanged after 189 days, while rabbit no. 1 progressed very slowly until at the present time, 29 months after treatment, the lens is similar to no. 3's and shows irregular, granular, anterior subcapsular and cortical changes and diffuse opacities in the posterior region (fig. 2). Rabbit no. 2 was killed after 17 months for histologic study, and at that time the posterior regions were diffusely cloudy, with a suggestion of concentration of the opacity in a central line. Some anterior subcapsular opacities were present.

In Group II opacities were noted in the posterior subcapsular region after 136 days. On the 194th day a band of fine bubbles had developed in the posterior polar region (fig. 3). Observations, made over a total period of 28 months, demonstrated no further changes. This group showed the least lens change of any of the animals treated.

Group III developed peripheral posterior subcapsular bubbles by the 81st day after the first treatment. These had extended to the entire posterior subcapsular region on the 178th day, and in 286 days had contracted to a dense horizontal posterior polar line with radiating striae of bubbles (fig. 1). These lenses showed no further change in the 28 months of observation.

Posterior subcapsular bubbles were observed 66 days after the first treatment in Group IV; these had formed a bandlike opacity on the 282d day which remained unchanged 18 months later.

Group V had posterior subcapsular opacities after 179 days, and in 265 days this had changed to a dense linear opacity with radiating bubbles. No change was noted up to 25 months.

### Summary

Cataractous changes occurred in the lenses of rabbits treated with the usual therapeutic doses of roentgen rays. The lenses showed the same early manifestations in all cases and the developmental morphology was consistently similar. The evolution of the opacity from a peripheral to a rather diffuse posterior subcapsular one, which, in turn, became a localized denser, stationary, scarlike opacity appears to indicate that the cataract is not progressive, but is the result of local damage at the time of irradiation that becomes visible with the further growth of the lens. Comparative analysis of the effects of the different dosages was not meant to be a part of the problem, and an accurate basis for drawing conclusions does not exist. It can be said, however, that the rabbits that received the smallest dose, Group II, also developed the least lens opacity, while those that received the greatest dosage in the shortest time (Group I) developed the great-

Table 1

RESULTS OF EXPERIMENTAL IRRADIATION OF RABBIT EYES

Group	Animal	Dosage	Type of ray	Conjunctivitis	Epilation percent	P.S.C.* days	A.S.C. <sup>o</sup> days	Result
I	1	2700 r in 6 days	long	+	100	83	126	Opalescence Histology Opalescence
	2	2700 r in 6 days	long	+	100	62	126	
	3	2700 r in 6 days	long	+	100	62	126	
II	1	600 r in 1 day	short	—	0	139	—	Very fine posterior dots unchanged after 194 days
	2	600 r in 1 day	short	—	0	136	—	
	3	600 r in 1 day	short	—	0	?	—	
III	1	3000 r in 22 days	short	sl.	50	81	—	Posterior polar unchanged after 268 days
	2	3000 r in 22 days	short	sl.	50	71	—	
	3	3000 r in 22 days	short	sl.	50	81	—	
IV	1	2000 r in 10 days	short	+	20	?	—	Posterior polar unchanged after 282 days
	2	2000 r in 10 days	short	+	20	115	—	
	3	2000 r in 10 days	short	+	20	66	—	
V	1	1200 r in 1 day	long	+	100	179	—	Posterior polar unchanged after 265 days
	2	1200 r in 1 day	long	+	100	179	—	

\* P.S.C. First appearance of posterior subcapsular changes.

<sup>o</sup> A.S.C. First appearance of anterior subcapsular changes.

est opacity. The injury produced by 3000 roentgens in 22 days caused little more change than did 2000 roentgens in 10 days.

Corneal change that could be attributed to the roentgen rays was not observed. Many times corneal denudations were noted, but on examining the

untreated eyes, similar denuded areas were also seen. These were perhaps due to trauma.

Hyperemia of the iris or iridocyclitis was not observed, and except for a transient purulent conjunctivitis and epilation no external manifestations of the treatments occurred.

## Part II

### Clinical study

Clinical observations were made of a number of patients who had received roentgen-ray therapy in the region of the eyes. Of this number only the five patients reported below were observed over a sufficient period of time (20 to 38 months) to warrant any conclusions. It is realized that the absence of lens changes within such a period of time does not preclude the possibility of future changes. Included in this report were two children in whom cataracts developed and three adults who showed no evidence of lens changes.

**Case 1.** D. J., a girl, aged 7 years, received roentgen-ray and radium therapy to the right and left orbits for an adamantinoma of the right ethmoid

region. The dosages were as follows:

Right Orbit		200 K.V. Thoraeus filter 200 r
May		
12, '33	lat.	
13	ant.	
16	lat.	
17	ant.	
18	lat.	
19	ant.	
22	lat.	
22	ant.	
25	lat.	
26	ant.	
31	lat.	
June		
1, '33	ant.	
3	lat.	
4	ant.	
7	lat.	
8	ant.	



Total direct dosage right orbit, 3200 r in 27 days.

Left Orbit	
May	
15, '33	lat.
18	lat.
20	lat.
23	lat.
27	lat.
June	
2, '33	lat.
6	lat.

200 K.V. Thoraeus filter 200 r

Total direct dosage left orbit, 1400 r in 22 days.

On May 24, 1933, 1401 mg. hrs. of radium was applied to the right orbit and ethmoids by needles inserted into the region. These needles had a wall thickness of 0.5 mm. platinum.

Examination of the eyes on January 3, 1934, revealed normal vision, lenses, and fundi. On July 1, 1935, the vision in the right eye was only 6/60, while in the left it remained normal. Ophthalmoscopic examination of the right eye showed punctate opacities in the posterior and anterior subcapsular regions. The fundus was seen with difficulty but an edema of the nerve head was observed. Slitlamp examination of the lens revealed a diffuse, irregular haze of the anterior subcapsular region which was due to fine, irregular, white flocculi and gray streaks that conformed to lens fibers. In the posterior subcapsular region was a typical, saucer-shaped complicated cataract; it was most dense at the posterior pole, light brown in color, and contained iridescent crystals. In the left lens observation with the ophthalmoscope showed a posterior polar opacity, approximately 3 mm. in diameter, which appeared as black, coalesced, punctate globules with similar discrete opacities radiating toward the equator. With the slitlamp no anterior opacities were seen, but there was an opacity in the posterior subcapsular region which was smaller and less dense than that in the right lens. The fundus was normal. In August, two months later, vision in the right eye had diminished to ability to count fingers at 1 meter; the lens was more opaque and the fundus invisible. The left eye had not changed.

In December, 1935, the vision of the right eye was reduced to hand movements and, ophthalmoscopically, only a faint fundus reflex was obtained. Slitlamp observation showed an increase in the white, anterior, radiating, subcapsular opacities and the small coalescing flocculi. There were many punctate white opacities in the anterior cortex and in the nucleus. Posterior cortical and subcapsular changes appeared to be of a similar nature but were poorly seen. The vision in the left eye was 6/9 and the appearance of the lens was similar to that at previous observations.

In March, 1936, vision in the right eye was reduced to perception of light and shadow. The iris had become atrophic, and the lens was more opaque, glistening golden yellow in color, and swollen. Large vacuoles and white punctate opacities were seen beneath the anterior capsule. The posterior layers of the anterior cortex were clouded but nuclear opacities were still visible. Vision in the left eye was 6/9 + 3 and the lens had undergone no further changes.

**Summary:** In a girl of 7 years opacities developed in the lens of each eye following short-wave roentgen therapy. The opacities developed between the 19th and 25th month after treatment and were rapidly progressive in the eye receiving the greater dosage; opacities which remained stationary formed in the posterior polar region of the opposite eye. The degree of injury to the right lens by the radium (a calculated equivalent dosage of approximately 1400 to 2100 r) is not estimated but because of the distance factor it is our opinion that there was a negligible radium effect on the left lens. The etiology of the papilledema and iris atrophy which occurred in the right eye, 25 and 31 months respectively after treatment, is not known. The neoplasm has not recurred.

**Case 2.** B. B., a girl, 11 years of age, began roentgen-ray treatment in February, 1933, for a fibrosarcoma of the left orbit. The vision at that time was 6/6 in the right eye and 6/15 in the left. The lenses and fundi were normal.

The following therapy was given:

	Left Orbit	
March		
1, '33	lat.	200 K.V. Thoraeus filter 200 r
2	lat.	
3	lat.	
6	ant.	
7	lat.	
7	ant.	
8	lat.	
8	ant.	
9	lat.	
10	ant.	
11	lat.	
13	ant.	
13	lat.	
14	ant.	
14	lat.	
15	ant.	
15	lat.	
16	ant.	
16	lat.	

Total dosage, 3800 r to left orbit in 16 days.

Approximate dosage to right lens from irradiation of left orbit laterally, 1350 r in 16 days.

On November 13, 1933, a few vacuoles were noted in the temporal posterior subcapsular region of the left lens, but further examinations, in March, July and October, 1934, failed to show any opacities in the lenses. In July, 1935, the vision in each eye remained unchanged. The right eye was normal, but in the left eye the ophthalmoscope showed an irregular aggregation of punctate posterior subcapsular lenticular opacities. Centrally these opacities formed a dense circular line within which the clouding was less intense, but at its periphery the black globules extended radially toward the equator. Slitlamp examination showed a typical posterior subcapsular opacity and, in addition, a few white, punctate, anterior subcapsular opacities with slight irregular clouding of the superficial anterior cortex.

In October, the vision in the left eye had decreased to 3/60 but there was little change in the appearance of the lens. The opacity was evidently of less extent but more clearly outlined and there were fewer radiating dots (fig. 4). In

May	16, '34	Left inner canthus
	19	Left inner canthus
	22	Left inner canthus

January, 1936, the vision had improved to 6/60 but no definite change was noted in the appearance of the lens. The right lens remained normal.

**Summary:** A girl, 11 years of age, who had roentgen-ray therapy to the left eye because of fibrosarcoma of the orbit developed lens changes. She had received a rather heavy dosage of short rays. Posterior subcapsular changes in the lens occurred between the 20th and 28th month. The opacity was not progressive, and 6 months after discovery appeared to be diminishing. The neoplasm has not recurred.

**Case 3.** W. P., a male, 46 years of age, was treated over the region of the inner canthus of the right eye for basal-cell carcinoma. The eye was protected by confining the rays to the area of the lesion.

The therapy was as follows:

August 11, '33.	To the lesion. 133 K.V. 1 al. filter 1000 r
August 12, '33.	To the lesion. 133 K.V. 1 al. filter 1000 r
November 17, '33.	No protection. 133 K.V. 1 al. filter 900 r
November 18, '33.	No protection. 133 K.V. 1 al. filter 900 r
November 20, '33.	No protection. 1300 K.V. 1 al. filter 900 r
February 5, '34.	To the lesion. 133 K.V. 1 al. filter 800 r
February 8, '34.	To the lesion. 133 K.V. 1 al. filter 800 r
February 9, '34.	To the lesion. 133 K.V. 1 al. filter 800 r

Total dosage, 7100 r in 6 months, of which 2700 r was given without protecting the lens.

At examination on February 15, 1936, the vision was normal and there was no evidence of lenticular changes that might be attributed to roentgen rays. Moderate nuclear sclerosis was present.

**Summary:** A patient, 46 years old, was treated for carcinoma of the inner canthus. Intensive treatment with long roentgen rays had not produced lens changes within 30 months after exposure.

**Case 4.** M. McC., a male, 38 years of age, was treated for carcinoma of the left inner canthus.

Therapy was as follows:

133 K.V. with 1 al. filter 900 r
133 K.V. with 1 al. filter 900 r
133 K.V. with 1 al. filter 900 r



October	5, '34	Left inner canthus	133 K.V. with 1 al. filter 800 r
	8	Left inner canthus	133 K.V. with 1 al. filter 800 r
	10	Left inner canthus	133 K.V. with 1 al. filter 800 r
February	16, '35	Left inner canthus	133 K.V. with 1 al. filter 500 r
	18	Left inner canthus	133 K.V. with 1 al. filter 500 r
	20	Left inner canthus	133 K.V. with 1 al. filter 500 r
	22	Left inner canthus	133 K.V. with 1 al. filter 500 r
	25	Left inner canthus	133 K.V. with 1 al. filter 500 r
	27	Left inner canthus	133 K.V. with 1 al. filter 500 r
January	4, '36	Left inner canthus	200 K.V. Thoraeus filter 300 r
	6	Left inner canthus	200 K.V. Thoraeus filter 300 r
	7	Left inner canthus	200 K.V. Thoraeus filter 300 r
	8	Left inner canthus	200 K.V. Thoraeus filter 300 r
	9	Left inner canthus	200 K.V. Thoraeus filter 300 r
	10	Left inner canthus	200 K.V. Thoraeus filter 300 r
	11	Left inner canthus	200 K.V. Thoraeus filter 300 r
	13	Left inner canthus	200 K.V. Thoraeus filter 300 r
	14	Left inner canthus	200 K.V. Thoraeus filter 300 r
	15	Left inner canthus	200 K.V. Thoraeus filter 300 r
	16	Left inner canthus	200 K.V. Thoraeus filter 300 r
	17	Left inner canthus	200 K.V. Thoraeus filter 300 r
	18	Left inner canthus	200 K.V. Thoraeus filter 300 r
	20	Left inner canthus	200 K.V. Thoraeus filter 300 r
	21	Left inner canthus	200 K.V. Thoraeus filter 300 r

The eye was protected during the treatment by confining the rays to the lesion.

Total dosage to left-eye region, 12,600 r in 21 months.

Examination of the eyes on April 16, 1936, revealed no evidence of lenticular opacities, either with the slitlamp or the ophthalmoscope. Vision was 6/9 in the right eye but only 6/15 in the left because of an acute staphylococcal conjunctivitis.

Summary: A man, 38 years of age, received intensive treatment to the left inner canthus over a period of 21 months. The eye was protected and no evidence of lenticular opacities was present 23 months after the first treatment.

**Case 5.** L. R., a male, 59 years of age, received roentgen-ray therapy for carcinoma of the left lower lid. Treatments were as follows:

October 4, '34. To the lesion. 133 K.V. 1 al. filter 800 r  
 October 6, '34. To the lesion. 133 K.V. 1 al. filter 800 r  
 October 9, '34. To the lesion. 133 K.V. 1 al. filter 800 r  
 January 7, '35. To the lesion. 133 K.V. .3 al. filter 1000 r  
 January 10, '35. To the lesion. 133 K.V. .3 al. filter 1000 r  
 January 14, '35. To the lesion. 133 K.V. .3 al. filter 1000 r  
 Total dosage, 5400 r in 4½ months.

The eye was protected by 2 mm. of

sheet lead. Observation April 1, 1936, showed both lenses to be clear.

Summary: A man, 59 years of age, received intensive treatment in the region of the left eye with long roentgen rays. The eye was protected with lead and no lens changes developed within 18 months.

### Summary

In the right eye of the first patient (case 1) a progressive cataract was observed 2 years after direct irradiation with 3200 r of highly filtered rays. A fractional part of the lateral irradiation of the left orbit was also received by this lens. The left lens which developed a nonprogressive cataract (after a latent period of 2 years) received 1400 roentgens directly and an additional indirect component of the 1600 roentgens that were directed to the right orbit from the lateral side. The fraction of the 1600 roentgens received by the left lens from treatment of the right orbit can be considered equal to the component of the 1400 roentgens received by the right lens from the lateral treatment of the left orbit. There remains therefore an additional dosage of 1600 roentgens that was received by the right lens alone. Whether this added amount of irradiation accounts for the difference between the stationary and progressive opacities of the two cata-

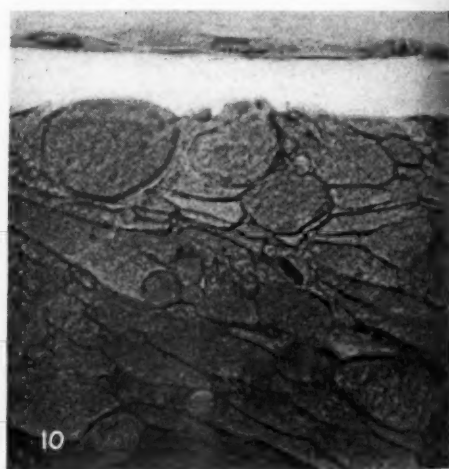
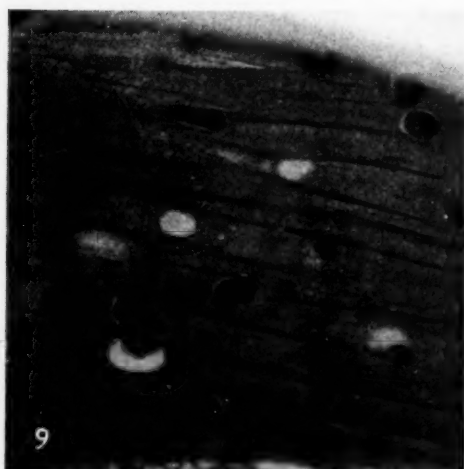
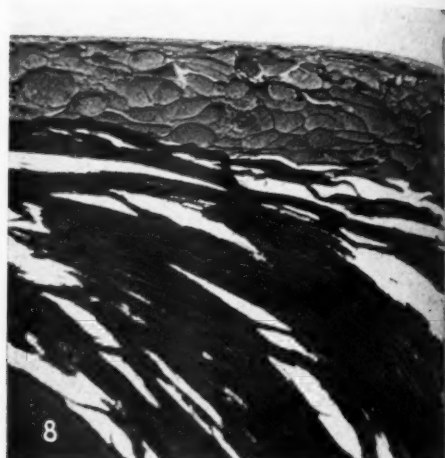
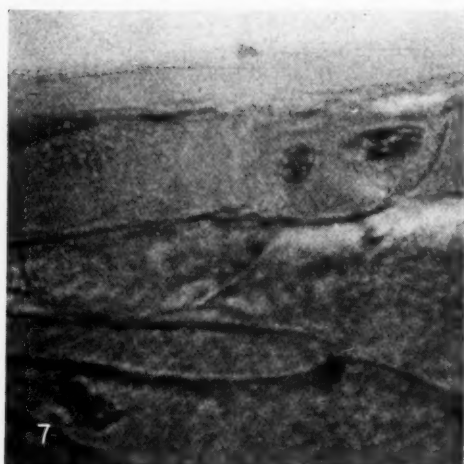
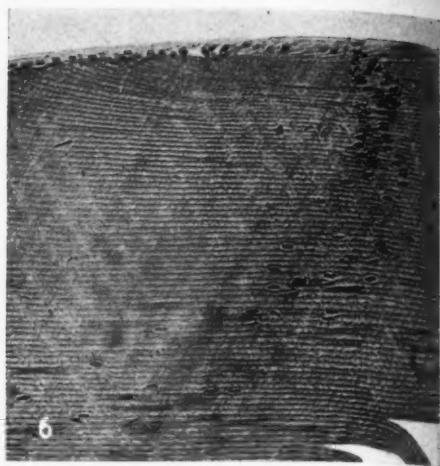
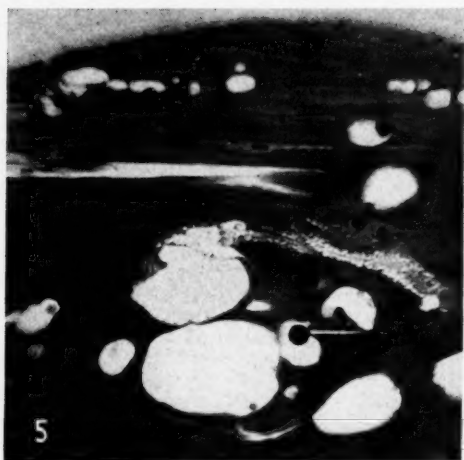


Fig. 5 (Leinfelder and Kerr). Equatorial region. Rabbit I-2.  
 Fig. 6 (Leinfelder and Kerr). Equatorial region. Normal rabbit.  
 Fig. 7 (Leinfelder and Kerr). Lens epithelium at equator. Rabbit I-2.  
 Fig. 8 (Leinfelder and Kerr). Posterior subcapsular region. Rabbit I-2. The equator is toward the left.  
 Fig. 9 (Leinfelder and Kerr). Lens bow. Rabbit I-2.  
 Fig. 10 (Leinfelder and Kerr). Anterior subcapsular and cortical regions. Rabbit I-2.

Table 2

CLINICAL RESULTS OF IRRADIATION OF HUMAN EYES

Case	Age	Quality	Dosage	Elapsed Time Since Treatment	Results	Latent Period
1	7	Short	O.D. 3200 r in 27 days O.S. 1400 r in 22 days O.D. 1401 mg. hrs. radium	34 months	Progressive cat. O.D. Stationary cat. O.S.	19-25 months
2	11	Short	O.S. 3800 r in 16 days	34 months	Stationary cat. O.S.	20-28 months
3	46	Long Long Long	2000 r* in 2 days 2700 r in 4 days 2400 r* in 5 days Total 7100 r in 6 months	30 months 27 months 25 months 30 months	Normal	
4	38	Long Long Long Short	2700 r* in 7 days 2400 r* in 6 days 3000 r* in 12 days 4500 r* in 18 days Total 12600 r in 12 months	23 months 18 months 14 months 4 months 23 months	Normal	
5	59	Long Long	2400 r* in 6 days 3000 r* in 8 days Total 5400 r in 4½ months	18 months 15 months 18 months	Normal	

\* Eye was protected.

tracts, or whether the radium was, solely or in conjunction with this, the contributing factor is not known. That the radium was responsible is indicated by the fact that the left eye of the second patient (case 2) received practically the same total dosage in a shorter period of time (more intense therapy) but developed only stationary opacities. The right lens in case 2 remained clear although it received a calculated indirect irradiation of 1350 roentgens because of therapy of the left lateral orbit. It seems unlikely that changes will now develop,

since the latent period for development of cataract as demonstrated by the opposite eye has passed. In these children the latent period was approximately two years.

The three adults received therapy in the ocular region but the lenses were protected in each case. From the clinical aspect alone there is little value in the observation that no lens changes have developed, but when compared with the microscopic examination of other human lenses it seems safe to assume that no opacities will develop.

### Part III

#### Microscopic study

Histologic examination of both rabbit and human lenses was made in an attempt to determine the morphology of the pathologic process. It was hoped that this would demonstrate the tissue changes, throw light on the pathogenesis of such cataracts, and demonstrate a similarity in pathologic appearance in the two groups. Fixation of the lenses was not uniformly successful, but good material was obtained from four

rabbits of three experimental groups and four human lenses. The unirradiated rabbit eyes served as controls in the experimental study.

#### Rabbit I-2.

Ophthalmoscopic examination of the irradiated lens showed an aggregate of small bubbles in the posterior polar region. These were arranged in a dense opaque irregular horizontal line from

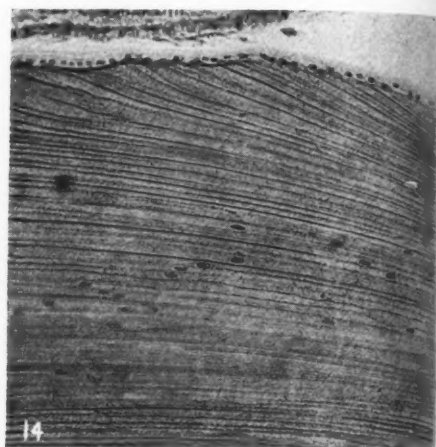
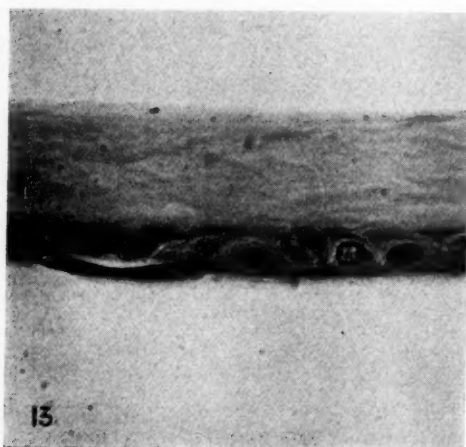
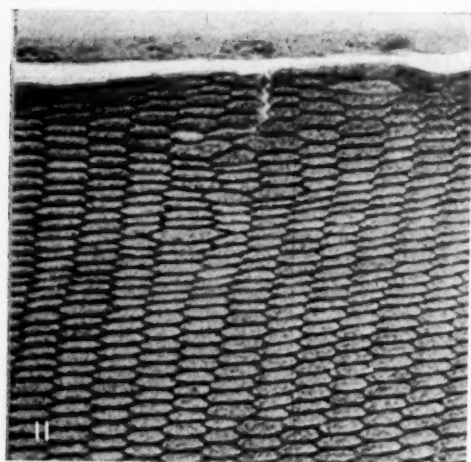


Fig. 11 (Leinfelder and Kerr). Anterior subcapsular and cortical regions. Normal rabbit.

Fig. 12 (Leinfelder and Kerr). Posterior polar region. Rabbit I-2.

Fig. 13 (Leinfelder and Kerr). Lens epithelium. Rabbit I-2.

Fig. 14 (Leinfelder and Kerr). Equatorial region. Rabbit III-2.

which radiated opacities of lesser density (fig. 1). There were also a few flocculent anterior subcapsular opacities. The eye was enucleated 23 months after irradiation.

Histologically there was pronounced swelling of the fibers at the lens bow (figs. 5 and 6). The protoplasm of these fibers was granular and they were separated by large and small vacuoles; an occasional small homogeneous globule was seen. The youngest cells, which lay beneath the capsule at the equator, were round, oval, and irregular in outline and

had completely lost the tendency to form lens fibers (fig. 7). The nuclei of these cells, as well as those of the more deeply placed injured fibers, were shriveled; however, the chromatin network was easily recognized, and some of the nuclei were degenerated. There was, in decreasing degree, an extension of the damage to the superficial fibers anteriorly and posteriorly (figs. 8 and 9). In the anterior subcapsular and cortical regions, disintegration of the swollen lens fibers was observed (figs. 10 and 11). In the posterior subcapsular region



the lens fibers were swollen and disintegrated in a thin layer continuous with the posterior extension of the equatorial changes (fig. 8). At the posterior pole degeneration extended into the cortex and in some areas small homogeneous globules were noted (fig. 12). A sharp line of demarcation existed between the pathologic and normal fibers. The entire lens epithelium was abnormal. In the anterior polar region the changes were less evident; in places the cells appeared enlarged, and the nuclei were swollen, some taking a dark stain, others appearing quite pale (fig. 13). Nearer the equator the cells were lengthened to several times normal.

#### Rabbit II-1.

Ophthalmoscopic examination of the pathologic lens showed a few discrete punctate opacities in the region of the posterior pole (fig. 3). Enucleation was performed 22 months after treatment.

Only the faintest evidence of pathologic change was seen under the microscope and it was with difficulty that the normal and irradiated lenses could be distinguished. Swelling of the fibers at the lens bow was apparent, especially at the anterior extremity where they were in contact with the lens epithelium. Although the posterior subcapsular fibers showed slight swelling it was no greater than that seen in normal lenses; there were a few areas of disintegrated fibers in the posterior cortex. No change was observed in the lens epithelium.

#### Rabbit III-2.

Ophthalmoscopic examination of the eyes before death showed a typical posterior polar opacity (fig. 1) in the irradiated eye. Enucleation occurred 20 months after treatment.

Microscopically there was a moderate degree of swelling of the fibers in the region of the lens bow (fig. 14) greatest

at the anterior extremity of the fibers (fig. 15) where they approached the lens epithelium. The nuclei of the fibers were somewhat irregular but the chromatin network appeared normal. No vacuolization was observed, and apparently normal lens fibers were being formed at the periphery. In the anterior subcapsular and cortical regions swelling and disintegration of the fibers were noted (fig. 16). The nuclei of the lens epithelium were shriveled and stained homogeneously because of disintegration of the chromatin network. In the posterior subcapsular region was a rather thick layer of degenerated and swollen lens fibers, in the midst of which there was an occasional homogeneous globule (fig. 17).

#### Rabbit III-3.

This rabbit received the same dosage as rabbit III-2, but the eyes were removed six months later. Examination at the time of death revealed a typical posterior subcapsular opacity in the irradiated lens. Enucleation occurred 26 months after treatment.

Moderate swelling of the lens fibers in the region of the bow was seen under the microscope. The pathologic changes in this eye were similar in almost every detail to the cataract in rabbit III-2. The lens epithelium appeared normal. There seemed to be slightly less change in the equatorial and anterior subcapsular regions, but a greater concentration of swollen, disintegrated fibers in the posterior polar region.

One lens from each of four patients who had received roentgen-ray therapy because of malignancies in the ocular region was available for study.

**Case 6.** C. B., a male, 46 years of age, received the following therapy for treatment of epidermoid carcinoma of the left lower lid:

August	12, '30	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 240 r
	13	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 120 r
	14	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 120 r
	16	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 120 r
	17	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 120 r
	18	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 120 r
	19	Left lower lid	180 K.V. 1 al. + $\frac{1}{2}$ cu. filter 120 r

September	11, '30	Left lower lid	180 K.V.	1 al.	+	½ cu.	filter 240 r
	12	Left lower lid	180 K.V.	1 al.	+	½ cu.	filter 240 r
	13	Left lower lid	180 K.V.	1 al.	+	½ cu.	filter 240 r
October	13, '30	Left lower lid	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	14	Left lower lid	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	15	Left lower lid	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	17	Left lower lid	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	18	Left lower lid	140 K.V.	1 al.	+	¼ cu.	filter 200 r
December	4, '30	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	5	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	6	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	8	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	9	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	10	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	11	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	12	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	13	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	15	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r
	16	Left lower lid	136 K.V.	1 al.	+	½ cu.	filter 200 r

Total dosage, 4880 r to left eye in 4 months, but 2400 r during the last 14 days.

This eye was removed on March 30, 1931, approximately eight months after the first roentgen-ray treatment, and four months after the last series.

Histologic examination of the lens showed normal epithelium. Fixation of the lens was poor and only small portions of the subcapsular region were present. In the region of the lens bow several layers of superficial fibers appeared normal but directly underneath was a layer of thickened fibers containing a granular precipitate. In addition, layers of swollen fibers were noted immediately beneath the posterior capsule.

**Case 7. R. C.,** a female, 75 years of age, received roentgen-ray therapy to the inner canthus of the right eye because of carcinoma.

Sept. 21, '32. Inner canthus. 130 K.V. 1 al. filter 1500 r

December 22, '32. Eye protected. 130 K.V. 1 al. filter 1000 r

February 24, '33. Inner canthus. 130 K.V. 1 al. filter 700 r

February 25, '33. Inner canthus. 130 K.V. 1 al. filter 700 r

February	5, '31	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 500 r
	9	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 400 r
	24	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 300 r
	25	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 300 r
	27	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 300 r
March	9, '31	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	10	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	13	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	16	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	18	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 200 r
	20	Right antrum and orbit	140 K.V.	1 al.	+	¼ cu.	filter 200 r
April	27, '31	Right antrum and orbit	190 K.V.	Thoraes	filter 200 r		
	28	Right antrum and orbit	190 K.V.	Thoraes	filter 200 r		

February 27, '33. Inner canthus. 130 K.V. 1 al. filter 700 r

Total dosage received by lens, 3600 r in 5 months.

The eye was enucleated on January 11, 1935, approximately 28 months after the first roentgen-ray treatment.

Microscopic examination of the anterior subcapsular portion of the lens revealed typical thickened fibers with granular protoplasm. Beneath was a layer of normal-appearing lens fibers, but deeper than this was a second layer of swollen and disintegrated fibers. In the equatorial region the appearance was similar but in addition there was a superficial layer of normal fibers. The posterior subcapsular region was not available for study. The combined thickness of the four layers involved in the process was less than 1/10 the diameter of the lens.

**Case 8. I. W.,** a negress, 38 years of age, received therapy in the region of the right eye because of carcinoma of the antrum.

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May	1, '31	Right antrum and orbit	190 K.V. Thoraeus filter 200 r
	2	Right antrum and orbit	190 K.V. Thoraeus filter 200 r
	6	Right antrum and orbit	190 K.V. Thoraeus filter 200 r
	7	Right antrum and orbit	190 K.V. Thoraeus filter 200 r

Total to right lens, 4200 r in 3 months.

The orbit was exenterated September 14, 1931, seven months after the first roentgen treatment.

Microscopic examination of this lens showed changes in the region of the lens bow similar to those in the lens of rabbit III-2 (fig. 18). The pathologic fibers extended both anteriorly and pos-

teriorly, but in the latter position there was a greater degree of damage to the lens substance. The process extended quite deeply into the lens but the actual degree of injury could not be determined since the only available section had been cut superficially through the equatorial portion of the lens. The lens

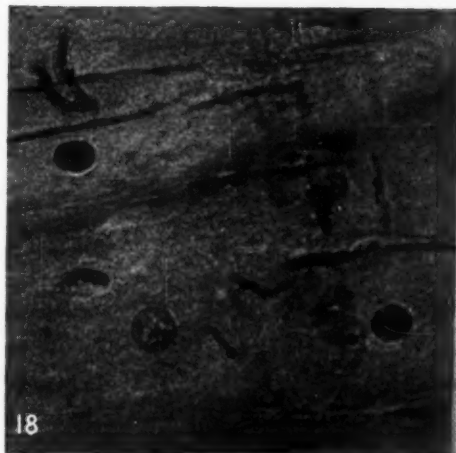
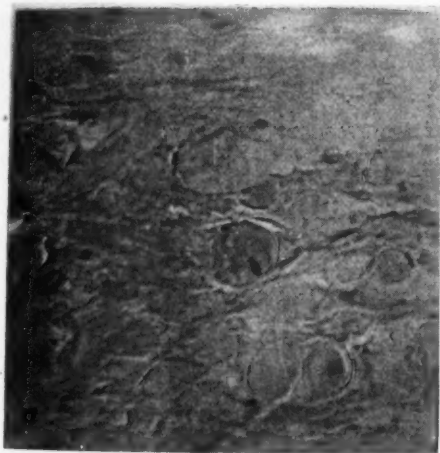
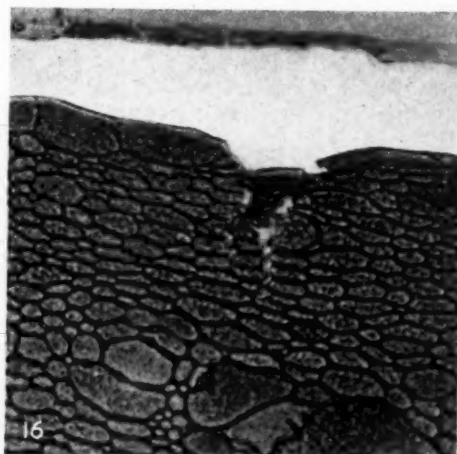
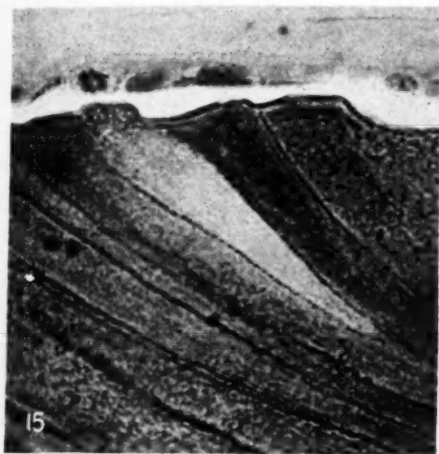


Fig. 15 (Leinfelder and Kerr). Anterior extremity of equatorial fibers. Rabbit III-2.  
 Fig. 16 (Leinfelder and Kerr). Anterior subcapsular and cortical regions. Rabbit III-2.  
 Fig. 17 (Leinfelder and Kerr). Posterior polar region. Rabbit III-2.  
 Fig. 18 (Leinfelder and Kerr). Equatorial region. Case 8.

epithelium showed no obvious change.

**Case 9.** J. O., a male, 68 years of age, received roentgen-ray therapy for a malignancy of the right lower lid.

### Discussion

The microscopic study of the lenses offers an explanation for the latent period in development of the opacities.

August	1, '32	Right lid	130 K.V. 1 al. filter	800 r
	3	Right lid	130 K.V. 1 al. filter	800 r
	5	Right lid	130 K.V. 1 al. filter	800 r
September	6, '32	Right lid	130 K.V. 1 al. filter	1500 r
November	10, '32	Inner canthus*	130 K.V. 1 al. filter	1000 r
May	11, '33	Right lid*	130 K.V. 1 al. filter	1500 r
August	11, '33	Inner canthus*	130 K.V. 1 al. filter	800 r
	13	Inner canthus*	130 K.V. 1 al. filter	800 r
	14	Inner canthus*	130 K.V. 1 al. filter	800 r

\* The eye was protected.

Total to right eye, 3900 r in 9½ months.

Total dosage to region, 8800 r in 12½ months.

The orbit was exenterated on August 23, 1934, approximately 24 months after the first treatment.

The epithelium was normal. There were several layers of normal lens fibers beneath the capsule at the lens bow. Under these normal fibers was a layer of swollen lens elements which extended anteriorly and posteriorly where it became subcapsular.

The greatest damage to the lens fibers occurs in the region of the equator, and it is only with growth of the injured fibers to the anterior and posterior regions that opacities in the lens are visible. That the posterior subcapsular opacity is the result of growth of injured fibers is indicated by the continuation of swollen fibers from this region to the equatorial region. Where

Table 3

HISTOLOGIC RESULTS OF IRRADIATION OF RABBIT AND HUMAN EYES

Animal	Type rays	Dosage	Interval months	Opacities		
				Equatorial	A.S.C.	P.S.C.
I—2	long	2700 r in 6 days	23	++++	++	++
II—1	short	600 r in 1 day	22	+	—	+
III—2	short	3000 r in 22 days	20	++	+	++
III—3	short	3000 r in 22 days	26	+	sl.	+++

Case	Age years	Type and Dosage	Interval months	Opacities		
				Equatorial	A.S.C.	P.S.C.
6	46	Long 960 r in 8 days	8			
		720 r in 3 days	7			
		1000 r in 6 days	6			
		2400 r in 14 days	4			
		Total 4880 r in 4 mos.	8	++	?	+
7	75	Long 1500 r in 1 day	28			
		1000 r in 1 day	25			
		2100 r in 4 days	23			
		Total 3660 r in 5 mos.	28	+++	++	++
8	38	Intermediate 4220 r in 3 mos.	7	++++	?	?
9	68	Long 2400 r in 4 days	24	+	+	+
		1500 r in 1 day	23			
		Total 3900 r in 9½ mos.	24			

the anterior subcapsular and equatorial changes were pronounced (rabbit I-2) progressive changes occurred in the irradiated lens of each of the remaining rabbits of the group. It appears, therefore, that following severe injury to the lens elements there is extension into the anterior as well as the posterior portions of the lens, and that such extension indicates a progressive opacity. Lesser degrees of injury cause only a stationary posterior polar opacity.

Considering the time factor the rabbits in Group I received the largest dosage and developed the most histologic change. The dosage in Group II (600 r in a single dose) was evidently not sufficiently intense to cause more than minimal changes. In the lenses from two animals of Group III, the expected similarity in appearances was observed. The dosage was moderately severe, and in terms of roentgen units was slightly greater than group I, but the time interval was considerably greater. The microscopic changes in the lens fibers were definite, and although all three regions were involved, the amount of swelling and disintegration of lens fibers in the equatorial region was much less than in the lens of the rabbit from Group I. The posterior subcapsular change was approximately as great, however, and apparently had increased during the six-month interval between the enucleation of the two eyes. There was little evidence of the formation of normal fibers at the equator even 26 months after treatment, but it is significant that the lens epithelium in the second rabbit appeared normal while there was evidence of pathology in the epithelial cells of the first animal.

The pathologic process prevented ophthalmoscopic and slitlamp examinations of the eyes of the patients whose lenses were studied microscopically. The youngest patient (case 8) received the most treatment in the shortest period of time, and the appearances of the equatorial region of this lens were similar to that of the lens of rabbit III-2.

The histologic changes in the lens in case 7 presented two distinct but similar layers of pathologic fibers which were separated from each other by a

number of normal-appearing fibers. In addition there was a superficial normal layer at the equator. Although the lens was exposed to two series of treatment it does not seem logical to assume that the pathologic layers were the result of individual dosages 5 months apart, but the histologic picture suggests this. The extent of the pathology, although only 0.1 the diameter of the lens, was greater than would be expected from 28 months of normal lens growth in a person 75 years of age. The question of stimulation of cellular proliferation by roentgen rays has not as yet been satisfactorily answered.

The treatment in case 9 was distributed over the longest period of time. The changes were minimal, and at the equator, superficial to the changed fibers, a layer of normal lens fibers was recognized.

The lens from case 6 was obtained eight months after irradiation and from a study of the table one would expect its appearance to be similar to that in case 8. The occurrence of considerably less pathology may have been influenced by the greater age of the patient and by variation in the dosages and intervals of treatment, for 50 percent of the therapy in case 6 was given during the last two weeks of the 4-month interval. It is likely that only the last two series of treatments affected the lens, for the other dosages were small.

The lens epithelium showed no apparent change in any of the human lenses, but in rabbits I-2 and III-2 there was definite evidence of injury to the cells of this layer. In all but the former lenses, the first evidence of injury occurred at the equator, where it involved the growing fibers. That change occurred in the epithelium is indicated not alone by the fact that it was microscopically apparent in two lenses, but also by the appearance of the fibers formed following irradiation. Even at a period as late as several months after exposure of the experimental animals, pathologic fibers were still being formed in the region of the nuclear bow, and in some instances apparently from normal lens epithelium. Whether the normal-appearing fibers at the lens bow

are actually normal has not been ascertained. It is possible that the lens fibers begin their growth as normal cells, but after an interval take on the swollen characteristics of the pathologic cells.

In the experimental animals only the lens of rabbit II-1 showed evidence of the formation of normal fibers at the lens bow, yet, with the exception of case 7, the period between irradiation and enucleation was greater than in any of the human lenses. The presence of superficial normal fibers in the human lenses may be due to a difference in susceptibility of the lens epithelium, or to peculiarities in dosages of roentgen rays. The lenses showing these phenomena, however, all received therapy that was similar to that given to the rabbits. Even though in all cases the number of newly formed fibers exceeded what would be expected from normal growth of the lens, the conclusion that the pathologic fibers were the result of roentgen injury is made because of the similarity to experimental changes and the absence of comparable changes in nonirradiated lenses.

The presence of these normal fibers and the extension of the pathologic fibers to the more central posterior portion of the lens after a period as short as eight months (case 1) and the absence of advanced opacities in two years or more (cases 7 and 9) do not suggest the occurrence of progressive changes in these lenses, nor a longer latent period (two years) than was found in the children. From this observation one can assume that the three adult patients studied clinically will not develop cataracts.

The authors do not subscribe to the belief of Milner and Stallard that the lenticular damage is indirect through injury to the vessels of the ciliary body, nor do they agree with Grzedzielski,<sup>29</sup> who finds proliferation of lens epithelium along the posterior capsule. It appears, as has been noted by Okusawa,<sup>30</sup> that the lens changes result from a direct injury to the growing lens epithelium with the formation of pathologic swollen fibers that disintegrate in the posterior polar region with the production of a posterior subcapsular cataract. The histology indicates that unless the

primary injury is severe the opacity is not progressive, while the future formation of normal fibers appears probable when less intense dosages are given. There is no microscopic evidence of opacities in the nuclear portions of the lens, but that large dosages can cause disintegration of the entire lens is not denied, for both clinical and experimental studies have developed lenses with extensive changes in the deep layers.

Correlation between the behavior of the rabbit and human lenses following roentgen irradiation has been demonstrated. A similarity exists between the histologic appearance of the cataracts produced, and similar morphology was evident on ophthalmoscopic and slit-lamp observation. There is no doubt that roentgen rays will cause cataractous changes in the lens, but whether or not progressive opacification will develop seems to depend upon a number of factors. Of these the dosage and quality of roentgen rays is of primary importance. Single massive doses of long rays are the most likely to produce damage, while repeated small doses of short rays given at intervals of 4-6 times a week are less injurious. This has been pointed out by Gasteiger and Grauer<sup>13</sup> who recommend treatment by repeated small doses. It is obvious that the relationship of the lens to the field treated with roentgen rays influences the possibility of cataract formation. The therapy of a more remote lesion, or one that allows protection of the eye with a lead shield should not be so dangerous as one that requires full exposure of the eye.

### Conclusions

1. Nonprogressive cataract was the usual result of irradiation of the rabbit lens with ordinary therapeutic doses of roentgen rays.
2. In equal dosage short roentgen rays were better tolerated than the long.
3. Two children, after a latent period of two years, developed opacities in the lenses following roentgen-ray therapy.
4. No opacities occurred in the lenses of adults when the eye was shielded.



5. Small doses of roentgen rays did not effect the lens (case 2, right eye).

6. Nonprogressive changes consisted of a posterior polar horizontal linear opacity with radiating rows of vacuoles.

7. Microscopic examination of rabbit and human lenses showed subcapsular swelling and degeneration of lens fibers.

8. Primary injury by roentgen rays appeared to effect the lens epithelium, the cells of which subsequently formed pathologic lens fibers.

9. Early microscopic changes were seen at the equator, but with growth

the damaged fibers extended to the posterior polar region.

10. Anterior subcapsular and cortical changes indicated more severe damage that resulted in total opacity of the lens.

11. In the later stage of the nonprogressive cataract the microscopic changes were greatest at the posterior pole.

12. Clinical and histological studies indicated that progressive cataract did not invariably follow exposure of the human lens to roentgen rays.

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- <sup>24</sup> Scheerer, R. Klin. M. f. Augenh., 1925, v. 75, p. 27.
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- <sup>26</sup> Meesmann, A. Klin. M. f. Augenh., 1928, v. 81, p. 259.
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- <sup>28</sup> Milner, J. Brit. Jour. Ophth., 1934, v. 18, p. 497.
- <sup>29</sup> Grzedzielski, J. Klin. M. f. Augenh., 1935, v. 95, p. 360.
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**Discussion.** DR. THOMAS D. ALLEN: Are there not patients in whom little or no change develops? If so, is it possible to tell before treatment whether cataracts will develop?

DR. LEINFELDER: The question is rather difficult to answer, because there are so many variables that can influence what is going to happen to the patient. I believe that if the patient were to receive a small dose of Roentgen rays—e.g., 600 roentgens—with filtration of one-half millimeter copper and one millimeter aluminum, and that patient

were forty-five to sixty-five years of age, the probability of a cataract would be so remote that it need not be considered.

On the other hand, if one were to treat such a patient with 2700 or 4000 roentgens of relatively unfiltered rays, I think I would promise him a cataract. So that type of prognostication must depend on a number of factors.

DR. ALLEN: May I explain myself? There are some—even children—who have had considerable X-ray treatment and who apparently do not develop

cataract. There are others in middle life who have beginning cataract to whom considerable X-ray therapy is given without noticeable increase in the cataract.

Can we tell before giving the treatment whether the case at hand is apt to develop cataract or is apt to fall in that class which does not seem to be particularly susceptible to the X-ray?

DR. LEINFELDER: Two points are involved, I think, in the question. One is, what is the latent period for cataract formation? and the second is, will added insult act in a progressive manner after the first injury?

The latent period for children over seven apparently is two years, from the results of two cases. The latent period in adults is not determined. I believe that moderate X-ray therapy may be administered to a child who has been irradiated previously—let us say three years before—with relatively no danger of developing a cataract but there is appreciable hazard in making a prognosis.

Whether or not the patient will develop lens changes depends entirely upon the dosage and the method of ad-

ministration. If one adheres to standard filtered therapeutic doses in not too great intensity, one perhaps can avoid causing a progressive cataract.

DR. EDWARD JACKSON: Are there any observations indicating that the direction of the radiation influences its effect on the lens, whether it reaches the lens epithelium through the ciliary body or through a considerable thickness of tissue, or whether it comes directly into the pupil? Of course, the critical lens epithelium is toward the periphery of the lens.

DR. LEINFELDER: I believe I will ask Dr. Kerr to express an opinion on that—whether the direction of irradiation has any effect on the amount of roentgens that the lens gets other than a distance factor.

DR. KERR: I think, with the filtration which we try to use in these cases, which is equivalent to two millimeters of copper on the lateral orbital wall, it makes very little difference as to the intensity which the lens receives. I think it makes no difference whether the rays penetrate laterally or from the anterior.



## THE MINOR SEQUELAE OF EYE CONTUSIONS

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To test the validity of the late Henri Frenkel's notion of the anterior-segment traumatic syndrome, thirty-four consecutive eye contusions were tabulated with reference to sequelae in cornea, pupillary reflexes, iris, lens, vitreous, fundus, and visual acuity. Dehiscences of the retinal layer of the iris were found by slitlamp diaphragm transillumination in the fundus reflex in half of the cases, and so frequently related topographically to the lens and peripheral fundus sequelae as to justify Frenkel's syndrome theory, and to support his thesis of the active role of the subluxated lens in the production of the syndrome. The effect of the anterior-segment lesions on visual acuity, when the media are clear, is due, however, to easily overlooked posterior-pole contrecoup lesions generally.

Perforating injuries of the globe and their late complications—retinal detachments, cataracts, and phthisis bulbi—present no medico-legal problems in workmen's compensation. Severe contusions of the globe with marked hyphema, hemophthalmos, and corneal and scleral ruptures are hardly ever untreated or subject to controversy. Neither is the traumatic origin of the major sequelae of such contusions, such as sphincter tears, iridodialysis, lens subluxations, vitreous prolapse, choroidal ruptures, retinitis proliferans, and retinal detachments, often disputed. Minor eye contusions, often masked by the more superficial lid, conjunctival, and corneal lesions, and occasionally untreated altogether, or not referred by the general practitioner to an ophthalmologist in their early stages, now and again give rise to medico-legal problems. The major sequelae are amply dealt with in textbooks and special monographs dealing with eye injuries, notably in the classical treatises by Praun,<sup>1</sup> Maitland Ramsey,<sup>2</sup> Wagenmann,<sup>3</sup> Birkhäuser,<sup>4</sup> and Würdemann.<sup>5</sup> Our knowledge of the minor sequelae on the other hand is recent and dates only from the wider experience of the World War and particularly from the introduction of the slitlamp.

References to the minor sequelae are scattered in the literature accumulated since then, and monographs and atlases dealing with war injuries and slitlamp microscopy, notably those of Lagrange,<sup>6</sup> von Szily,<sup>7</sup> Vogt,<sup>8</sup> Koeppe,<sup>9</sup> the French Society of Ophthalmology,<sup>10</sup> and Kobayashi.<sup>11</sup> They have not found their way into textbooks and are therefore not widely known. The only systematic

attempt to deal with these minor sequelae, but without utilization of slitlamp findings, was made by the late Henri Frenkel<sup>12, 13, 14</sup> during and after the War in several papers in the development of his notion of the anterior-segment traumatic syndrome.

The large number of eye injuries examined at the New York State Department of Labor, Bureau of Workmen's Compensation, offered the writer an opportunity to make a study of the minor sequelae of eye contusions and special attention was devoted during the whole year of 1935 to this subject. Since the depression and the application of more adequate safety measures, the average annual number of eyes examined at New York City has decreased but it still amounts to about 2,700. Intraocular pathology is exhibited by 15 percent of which a third are due to contusions. It is therefore a major item in medico-legal ophthalmology.

In order to gain a clear picture of the minor eye contusions and their sequelae, of the frequency of the various sequelae, of their relation to visual acuity, and of the validity of Frenkel's notion of the anterior-segment traumatic syndrome, 34 cases were selected for tabulation. The major eye contusions—those with enucleation, or phthisis bulbi or total traumatic cataract as end result—and the indirect eye contusions leading to detachments—for instance, which occur in eyes predisposed by previous disease or injury—some incomplete cases, and pure posterior-segment cases were left out of consideration.

The attending ophthalmologist's re-

**Table 1**  
**EYE CONTUSIONS WITH ANTERIOR-SEGMENT INVOLVEMENT**

Number, Occupation, and Name	Age	Date of Accident	Eye	Accident	Injury	Last Date of Bureau Examin.
1 Janitor DeG. J.	57	3/ 4/35	O.D.	While looking up dumb-waiter shaft, piece of wood struck right eye.	Vitreous hemorrhage, hyphemia, sublux. lens, "light area upper temp. sclera seen by transill."	12/26/35
2 Polisher C. S.	40	2/ 3/34	O.S.	Die struck left eye	Upperlid laceration and intraocular hemorrhage	8/ 9/35
3 Carpenter Z. J.	34	3/26/34	O.D.	Brass struck right eye	Chemosis	9/26/34
4 Foreman R. D.	?	8/30/34	O.S.	Sewing-machine belt snapped and struck left eye	Hematoma of lids, sphincter tears, iridodonesis	3/15/35
5 Saw Worker J. M.	21	8/16/34	O.D.	Saw broke and cut over right eye	Laceration over right eyebrow and malar bone, hyphemia	11/21/35
6 Carpenter A. A.	36	11/26/35	O.D.	Nail struck right eye	Contusion left eye	2/27/36
7 Brush Capper V. A.	35	11/ 5/34	O.S.	Struck by piece of wire	Abrasion cornea	1/ 3/35
8 Social Worker S. W. A.	39	6/23/24	O.S.	Block of wood in sawing careened back from ground and struck left eye, breaking glass	Laceration around orbit and unconscious	3/13/35
9 Carpenter M. A.	50	3/11/35	O.S.	Nail flew up while hammering, and struck left eye	Erosion cornea, Desmet's folds, aqueous cloudy	1/ 3/36
10 Laborer C. J.	43	2/ 2/33	O.D.	Stone struck right eye while hammering	?	10/23/35
11 Hack driver McA. A.	40	9/12/35	O.D.	Thrown from taxi to road	Laceration right face, skull fracture (?), ecchymosis of lids, peripheral facial paralysis, infection	2/21/36
12 Hack driver A. P.	35	11/27/33	O.D.	Struck right eye and nose in altercation with fellow worker	Right eye: Ecchymosis, subconjunctival hemorrhage, hyphemia, iritis Left eye: Ecchymosis	2/19/36

Table 1

EYE CONTUSIONS WITH ANTERIOR-SEGMENT INVOLVEMENT

Cornea	Pupil Larger, Deformed, and Paretic	Iris Transillumination and Sphincter Involvement	Lens Opacities and Subluxation	Anterior Vitreous Pigment Particles	Fundus Lesions	Visual Acuity, End Result	Remarks
-	+	Radial at "6 o'clock," sphincter intact	Axial, anterior capsular and subluxation	+	Not clear	20/50	Wooden sliver subconj. upper tempor.
-	+	Upper nasal and upper temporal transill.	Sublux.	+	Upper temp. pigmented chorio-ret. scar	20/20-4	
-	+	Upper temporal root transill.	Upper tempor. small opacity	+	Upper temp. pigm. chorio-retin. scar	20/20-	
-	+	Border of pupil notched at "6 o'clock"	Axial, small anterior capsular	+	Lower peripher. pigm. chorio-ret. scar	20/20	
-	+ Slightly	Multiple radial temporal transill.	Temporal, faint anterior capsular op.	+	Temporal pigmented chorio-ret. scarring	20/40	Metamorphopsia
-	+	Upper nasal iridodialysis	Nasal anterior capsular op.	+ On prolapsed vitreous nasally	-	20/33	Refraction: -3.50 D. cyl. ax. 30°
-	+	Extensive lower quadr. transillum.	-		Lower temp. peripheral chorio-ret. scarring	20/20	
-	+	Radial and parallel transill. in several quad.	-	+	Upper temp. disinsertion and total detachment	No L.P.	-13 D. myopia
-	+ Iridodonesis	Upper temp. transill.	Axial, scatter. anter. capsular op.	+ On upper temp. prolapse	Not clear	20/66	
-	+	-	Anterior capsular op. at "12 o'clock"	+	Normal	20/20	
-	+	Upper temp. pupil border notched, no transill.	Anter. and post. capsular temp. op.	+	Irregular lower temp. fluffy chorio-ret. pigm. lesion	20/200	
-	Larger but round	No transill.	-	+	Parallel equatorial ret. tear below, 6 disc d. in length and 1 across	20/20-2	Unchanged under 2½ years' observation

Table 1

## EYE CONTUSIONS WITH ANTERIOR-SEGMENT INVOLVEMENT

Number, Occupation, and Name	Age	Date of Accident	Eye	Accident	Injury	Last Date of Bureau Examin.
13 ? K. O.	?	?	O.D.	Knife jumped and cut right eye	Laceration through entire thickness of upper lid at middle	12/18/35
14 Cafet. worker S. W.	27	4/16/34	O.D.	Cork of beer barrel struck right eye	"Black eye only, no injury to globe, zonular cataract and myopia" observed 11 days later	1/ 7/35
15 Electrician G. J.	48	8/16/34	O.D.	Pipe struck right eye	No data	10/31/34
16 Auto mechanic G. R.	34	4/19/35	O.D.	Struck right eye by pipe on putting on belt	Laceration upper lid	9/ 3/35
17 Salesman S. J.	27	1/25/35	O.S.	Struck by branch of tree	Laceration upper left and right lids, hyphemia left	5/3/35
18 ? S. N.	53	8/31/34	O.S.	Hook struck left eye	Hyphemia	10/11/35
19 Stone-cutter McB.	53	6/ 2/34	O.S.	Struck by stone	Contusion	2/ 7/36
20 Mechanic B. N.	25	7/26/34	O.S.	Left eye struck by water from twisted hose	Chemosis, ecchymosis, for. b.'s in conj., hyphemia, sph. tear	?
21 Rock exc. N. T.	50	7/15/35	O.D.	Struck by stone	Corneal abrasion	11/23/35
22 Cab. mak. F. A.	21	12/22/34	O.S.	Struck by nail	Vitreous hemorrhage, iridodialysis	2/19/35
23 Stevadore S. P.	49	11/19/34	O.S.	Piece of wood struck left eye	Hyphemia	4/24/35
24 Tailor L. Y.	46	8/23/35	O.S.	Sewing-machine belt broke and struck left eye	Laceration of cornea	12/30/35

Table 1

EYE CONTUSIONS WITH ANTERIOR-SEGMENT INVOLVEMENT

Cornea	Pupil Larger, Deformed, and Paritic	Iris Trans- illumination and Sphincter Involvement	Lens Opacities and Sub- luxation	Anterior Vitreous Pigment Particles	Fundus Lesions	Visual Acuity, End Result	Remarks
-	+	No transill.	Temporal coronary op.	+	Extensive pe- ripheral temporal pig- mented chorio- ret. scar	20/20	See Vogt, <sup>a</sup> vol. 2, for similar case
-	Normal	No transill.	Anterior and post. capsu- lar op. and pe- ripheral riders	-	-	20/40	1926, 1972 and 1929 Swiss Army records of 20/20 O.U. Refr. incr. from -2D. to -3.5D. under obs.
-	+	Sphincter tears, no transill.	Sublux.	+	-	Varies between 20/25 and 20/100	
-	+	Upper temp. and upper nasal trans- ill.	Upper temp. and upper nasal ant. capsular op.	-	-	20/20-3	
-	+	Sphincter tear below	Sublux., anter. ax. capsular op.	-	-	20/20	
-	+	Temp. and nasal root transill.	Anterior and post. caps- ular op.	-	- Not clear	20/100	
No deposit of pigm. on Desc.	+	No transill., iridodonesis below	Anterior and post. capsu- lar op.	+ On prolapse from below filling pupil	-	20/40	
-	+	Extens. lower quadr. transill.	-	-	-	20/20	
-	+	Temp. root transill.	-	-	-	20/20	
-	+	Lower nasal root transill.	-	-	-	20/20	
Lower tempor. radial scars	+	Lower temp. radial trans- ill.	-	Bilat. non- pigm.	-	20/40	
Perfor., tempor. scars	Normal	No transill.	Small tem- poral ant. capsular op.	+	-	20/20	



Table 1

## EYE CONTUSIONS WITH ANTERIOR-SEGMENT INVOLVEMENT

Number, Occupation, and Name	Age	Date of Accident	Eye	Accident	Injury	Last Date of Bureau Examin.
25 Garage worker M. J.	25	2/ 7/34	O.S.	Held up and struck on head with lead pipe	Laceration of forehead, brain concussion, black left eye	1/20/35
26 Oil burner A. L.	28	10/20/34	O.D.	Explosion of tank while giving oil test	Numerous subconj. for. b.'s in right eye	?
27 Milkman A. B.	27	8/27/35	O.S.	Rubber belt struck left eye	No injury, high myopia	10/ 2/35

## EYE CONTUSIONS WITH ANTERIOR- AND POSTERIOR-SEGMENT INVOLVEMENT

28 Carpenter S. S.	38	9/13/34	O.D.	Piece of wood struck right eye	Laceration of upper lid, intraocular hemorrhage	1/23/35
29 Assembler H. J.	34	2/19/35	O.S.	Air-gun piston struck left eye	Laceration of left eyebrow and hemophthalmos	2/21/36
30 Auto mechanic S. N.	29	8/ 1/33	O.D.	Hood splinter struck right eye	Iridodialysis	?
31 Laborer F. W.	18	7/ 9/34	O.S.	Steamhose exploded in face	Ciliary injection, cornea studded with deposits, posterior-lens op., chorioret. lesion	10/29/35
32 Helper D. J.	46	9/21/35	O.D.	Water from high-pressure hose struck right eye	Hypphemia and hypertension	11/ 6/35
33 Street cleaner G. C.	45	3/29/34	O.S.	Struck by flying ball	Vitreous hemorrhage, subluxated lens	?
34 Laborer S.O.	24	4/20/34	O.S.	Piece of drill struck left eye	Contusion. Not seen until 2 months later	6/15/35



Table 1

EYE CONTUSIONS WITH ANTERIOR-SEGMENT INVOLVEMENT

Cornea	Pupil Larger, Deformed, and Paretic	Iris Transillumination and Sphincter Involvement	Lens Opacities and Subluxation	Anterior Vitreous Pigment Particles	Fundus Lesions	Visual Acuity, End Result	Remarks
-	Normal	No transill.	Axial anterior capsular op. and vacuoles	+	-	20/50	Refraction: increase from -1D. to -5D. under obs.
-	+	Lower temp. transillum.	-	-		20/20	
-	Normal	Normal	-	-	Extensive lower temp. Pigm. chorio-ret. lesion with macular edema	20/40	

EYE CONTUSIONS WITH ANTERIOR- AND POSTERIOR-SEGMENT INVOLVEMENT

-	+	Normal	Upper nas. anterior capsular op.	+	Pigmentation of fovea-punctate	20/20-2	
-	+	Radial transill. at "12 o'clock." Sphincter intact	-	+ Disappeared in 1 year	Irregular choroid rupt. between disc and fovea		Refraction: -1.5D. cyl. ax.180°
-	+	Lower temp. iridodialysis	-	-	Lower temp. disinsertion, choroid. rupture, macular hole, and detachm.	20/200	
-	+	Temporal half of root transill.	-	-	Macular and upper juxta-papillary chorio-ret. pigm. scarring	20/40	
-	+	Numerous sphincter ruptures	Posterior beaten-silver op.	-	Punctate foveal pigment	20/20	
-	+	Normal	-	+	Punctate temporal parafoveal pigment	20/100	
Pigm. on Desc.	Round	-	-	Non-pig. opacities	Lower nasal ret. hole with lid attached	20/30	

ports and C-5 forms contain rarely more than summary diagnoses, such as contusion, or the principal findings and sequelae, such as hyphemia, intraocular hemorrhage, iridodialysis, lens subluxation, or detachment. These are found under "Injury" in tables. The cases are seen months and sometimes years after the injury and the observations of the sequelae are those of the writer.

#### **Slitlamp diapupillary iris transillumination in fundus reflex**

While all anterior-segment findings recorded are those with slitlamp and microscope, transillumination of the iris (diaphanoscopy or retroillumination) by the diapupillary method with slitlamp and unaided eye in the fundus reflex was found more satisfactory. The brightness of the fundus reflex, seen in the pupil or in any other adventitious defect in the iris (iridodialysis for instance) is much reduced when examined with the microscope, because of the magnification, wide angle between incidence and observation and light absorption. If one wishes, therefore, to secure a maximum brightness of the fundus reflex in looking for iris translucencies, one has to dispense with the microscope and employ the diapupillary method. That it is the fundus reflex which makes transillumination of the iris or the anterior segment in general possible and not, as is often stated in books on slitlamp microscopy, reflection from the lens, is obvious from the fact that the translucent areas are red and are always described as red and glowing, regardless of whether the lens is cataractous or not and whether the iris defect is confined to the pigment layer or traverses the entire thickness. It is only in transillumination of the pupillary border of the iris that reflection from the lens comes into play and the translucent border is then not red.

Insistence on the use of the microscope has apparently distracted attention from the possibilities of the high intensity of the slitlamp beam for anterior-segment transillumination and particularly for diapupillary transillumination of the iris. No references, ex-

cept an occasional discouraging one, are found in the writings of Koby, Graves,<sup>15</sup> Butler,<sup>16</sup> Koeppe, Vogt, and Mawas<sup>17</sup> to diapupillary transillumination, and diascleral illumination has been found much inferior by the writer.

The procedure employed in bringing out even the minutest depigmentations of the iris has been to face the observed eye at a distance of about 25 cm. and direct the slitlamp beam into the pupil at as small an angle with the visual axis of the observed eye as possible. The latter is secured by having the slitlamp arm as close as possible to the observer's head and using a 100-mm. illuminating lens instead of a 70-mm. lens. The maximum intensity is secured by focusing the beam for the plane of the pupil. The beam then occupies only a small portion of the pupil, the free portion giving a fundus reflex. An overloaded slitlamp is necessary to secure the requisite intensity and the observer's light sense should be enhanced by dark adaptation. A small pupil is preferable in looking for defects which may disappear in the iris folds. The visibility of the iris defects seems little affected by the direction of the beam; that is, whether it is directed to the same or to the opposite side of the sector involved.

The cases tabulated were studied with particular reference to findings in the cornea, pupil, iris, lens, vitreous, and fundus periphery and fovea and to changes in refraction attributable to contusion. They are tabulated as those with anterior-segment involvement only and those with anterior- and posterior-segment involvement.

#### **Cornea**

Brown deposits on Descemet's membrane have been noted only once. Their frequent presence in iritis and uveitis, particularly chronic and in the senile, and comparative rarity in contusions as a sequel have acquired the significance of a differential diagnostic sign. It does not appear to form part of the contusion syndrome as a sequel, except, of course, in the presence of a complicating uveitis. This lack of attraction of Descemet's membrane for pigment

deposits in the pure contusions is strikingly illustrated in the cases in which a prolapsed vitreous projects like a mushroom half way into the anterior chamber and is densely peppered with pigment particles without the slightest tendency on the part of any of them to land on Descemet's membrane (cases 6, 9, 19.) When present, they are smaller, darker in color, and not at all like those in size and color seen in the vitreous, whether prolapsed or remaining retrolenticular, and suggest as their origin pigment-laden phagocytes rather than retinal (iridic or ciliary-body) pigment. The occasional corneal scarrings incident to the accompanying erosion or laceration is obviously not part of the contusion per se.

### Pupil

Traumatic mydriasis is the most frequent of the sequels of eye contusions. The pupil, however, is not simply irregular but most commonly D-shaped; that is, with a chord replacing the arc in a sector, similar to that in iridodialysis. It is sluggish in direct and consensual reaction to light and in convergence. It reacts poorly to mydriatics and miotics in the sector corresponding to the "chord" border and can hardly therefore, be described as or confounded with an Argyll Robertson pupil. Because sphincter tears are rare, minute when present, and, as seen with the slitlamp, present mainly a dispersion of pupillary-border pigment, the term paralytic mydriasis is misleading. **Traumatic iridoplegia**, since both sphincter and dilator are involved, would best describe the pupil. Its presence indicates an anterior-segment involvement, since in pure posterior-pole involvement it is met with much more rarely and there is rarely deformation. It was found in 85 percent of this series.

### Iris

Dehiscences of the iris pigment layer, manifested by transillumination particularly in the sector corresponding to the "chord" of the deformed pupillary border, is another very frequent sequel. Wagenmann referred to it as having been observed and described by Pohl-

enz in 1891, presumed that it is more often present but easily overlooked, and remarked that it is not visible with the ophthalmoscope but is to be detected by focal retroillumination. Frenkel also referred to its frequency. Graves in 1929 called further attention to dehiscence of the retinal pigment layer of the iris and suggested the name of epidialysis. Koby<sup>10</sup>, Mawas<sup>17</sup>, Vogt<sup>18</sup>, Cattaneo<sup>18</sup> and Vannas<sup>19</sup> also called attention to it. Vannas referred to it as diastasis or rupture of the pigment layer. What we are dealing with is simply an incomplete rudimentary iridodialysis with all the features belonging to it. The paresis of the dilator suggests that both the retinal and dilator layers are involved. The dehiscences are either single or multiple, confluent, round or irregular iris-root lesions corresponding to Fuchs's peripheral dark zone, where the iris is thinnest. Occasionally they are radial without involving the sphincter. Together with the characteristic pupil the evidence for an eye contusion involving the anterior-eye segment from iris root to transillumination is incontrovertible. Iris lesions are present in 50 percent of all cases including iridodialysis and notching of the pupillary border, with only 15 percent of sphincter tears so-called.

Other conditions in which iris transillumination occurs are to be borne in mind:

1. In cataracts, glaucoma, and senility the pigment border is often depigmented, but not the root, and there may be diffuse depigmentation of the lower iris sector, generally bilateral.

2. In the blue eyed, even in the young, there is the same diffuse translucency, more marked below and also bilateral.

3. In iritis and uveitis there is depigmentation of the pigment border and some translucency of the iris after rupture of the synechiae by mydriatics, but these are always obvious conditions and accompanied almost always by pigmented deposits on Descemet's membrane.

4. In mesodermal atrophy and anterior synechiae there is also translucency of the iris but the sharply out-

lined shrinking of the iris tissue and the synechiae are too obvious to lead to difficulty (Waite<sup>20</sup>).

5. It has been described, but not observed by the writer, in the following conditions: diabetes, retinitis pigmentosa, Horner's syndrome, after infectious diseases (chicken pox, Löwenstein<sup>21</sup>), in experimental herpes, sympathetic ophthalmia, in Argyll Robertson pupils, and in xeroderma pigmentosum.

6. In myopia, translucency has been found by the writer mainly below and radial and related to peripheral chorioretinal lesions. Obviously the same findings are found in detachments in myopic subjects, and, when observed, it is a problem as to whether the myopia or the contusion is responsible for these iris depigmentations.

7. Finally, it is observed in post-operative cases, after cataract extractions, for instance, which are after all traumas.

The list of conditions from which a differential diagnosis has to be made seems rather large. Most of the patients seen in compensation practice, however, rarely have cases complicated by these problems, being preponderantly healthy males between the ages of 20 and 45 years, among whom most of these conditions are not frequent enough to give trouble.

### Lens

Contusion opacities of the lens may be conveniently classified into the transient posterior cortical, permanent anterior, permanent posterior capsular (beaten silver) opacities, equatorial "riders," coronary opacities, and the late anterior cortical rosette and the late total traumatic cataract. Vossius's ring, following a hyphemia has been reported only once (not in this series) and when seen 3 months later had left only faint traces in the form of a few round epicapsular lens deposits with clear centers. Its rarity and disappearance and the clearing of the centers of deposits would argue against the explanation by Vogt of its being an imprint of the iris crushed against the lens and rather support the thesis of Hesse<sup>22</sup> and Zentmayer<sup>23</sup> that it repre-

sents a thin layer of blood on the lens capsule. The most frequently observed lesion is the small, tenuous, somewhat striated anterior subcapsular opacity, permanent and stationary, very often hidden under the iris, even in the larger posttraumatic iridoplegias, and so superficial at times as to suggest an involvement of the capsular zonular lamellae only, particularly when peripheral. The lens opacities almost always correspond to the depigmented iris sectors. This is also the sector where the iridodonesis indicates a backward displacement of the lens, as evidenced by the vitreous prolapse. The anterior chamber is also shallower in the same sector. The pressure of the vitreous and its mobility would seem a better explanation of the iridodonesis than the lack of support of the lens. Lens lesions (opacities and subluxations) were noted in 60 percent of the cases. In case 6, refraction changes seem directly related to desubluxation with myopic astigmatism as a result. Note also case 29 in which myopic astigmatism may be the result of a subluxation. Cases 14 and 25 show increase of the myopic refraction accompanying lens changes.

### Vitreous

The retrolenticular pigment particles seen after contusions are rather large and bright red, and easily distinguished from the smaller, dull-brown granules seen after vitreous hemorrhage from whatever cause—trauma or disease—which are in color and size more like those seen on Descemet's membrane in uveitis and in the senile. Vogt<sup>24</sup> first described them as "strikingly large bright red and brown particles in the vitreous and mobilized in large quantities in the anterior chamber after an unsuccessful attempt at magnet extraction of an iron particle in the ora serrata." Jeandelize<sup>25</sup> reported a similar observation after an unsuccessful attempt at extraction of an iron particle from the ciliary body. Koby on the other hand said, "To classify vitreous opacities by their color is useless. . . . One observer will describe them as reddish, another as yellowish brownish."



Kirby<sup>26</sup> describes them as "lusterful reddish brown granules" which he has observed "in detachment of the retina and obviously coming from the retinal pigment epithelium and after a contusion." To one who has seen them a few times, their bright-red color and large size are characteristic. The writer has often wondered about the noncommittal term "particles" or "granules." Since the same particles seen in the retrolenticular vitreous are those seen enmeshed in it when the vitreous has prolapsed into the anterior chamber, and their source can be only the pigment epithelium from the retina (as in detachment), ciliary body, or iris, there seems to be no good reason for not calling them plainly retinal pigment. Their presence is one of the common phenomena in contusions—occurring in 56 percent of the cases.

#### Fundus

At two vulnerable points minor sequelae are often noted: in the fundal periphery and at the fovea. In both situations they are frequently overlooked if indirect ophthalmoscopy is not used. The major posterior-segment lesions, the holes in the macula, and the choroidal ruptures have often been described and are familiar. The minor foveal whitish or pigment stippling and the parafoveal yellowish or slightly pigmented small patches, presumably remains of a Berlin's opacity—a disturbed continuity of the macular reflex and best seen in indirect ophthalmoscopy, suggestive of level changes—are often compatible with 20/20 vision and therefore not searched for. They may be regarded as contrecoup lesions complicating the anterior-segment traumatic syndrome of this series, rather than direct in the type of injury with which we are dealing. Their frequent observation leads the writer to conclude that the occasional subnormal vision obtaining in eye contusions with alleged normal fundus observed by Frenkel and others, probably represents minor foveal lesions overlooked.

References to the peripheral traumatic lesions are strangely scarce in textbooks and the literature. A recent

casual reference, therefore, is worthy of being quoted. Kirby wrote (*loc. cit.*): "After a contusion observed months after injury critical ophthalmoscopic examination revealed in the periphery an area of the retina with pigment similar to those seen about a tear." The condition often observed simulates what is regarded as an anterior-chorioretinitic manifestation of congenital or acquired lues, or an atypical retinitis-pigmentosa lesion, the lesions seen in myopia, after extraction of intraocular foreign bodies by the posterior route, and after detachment operations, and has been found in 58 percent of the cases.

#### Conclusions

A study of 34 eye contusions and an analysis of the sequelae show a prevailing concomitance of two to six lesions, obviously anatomically related to each other, and stretching from the iris root, along the lens equator, zonule, ciliary body, ora serrata, and vitreous to justify the notion of the anterior-segment traumatic syndrome described by Henri Frenkel. This is of medico-legal importance in the presence of a lesion in the anterior segment. The question then ceases to be whether it is related to a contusion, but rather concerns itself with the existence of an anterior-segment contusion syndrome. *Testis unus, testis nullus*, as Frenkel suggested, becomes a reasonable guide.

From a study of sequelae alone, no conclusions can be drawn as to the mechanism of contusion, namely as to whether the lens is an active agent in the production of the syndrome, as Frenkel taught, expressing it by saying that the lens distends the iris as the "fetus distends the uterine cervix." The classical Arlt teaching of the widening of the corneoscleral ring as the main factor, and recently revived by Gradle,<sup>27</sup> would seem to the writer to rest too much on the purely mechanical hydrodynamic notion of the eye as a bag containing an almost incompressible fluid transmitting pressure applied to it equally in all directions. This



is out of keeping with the experiences of the World War, which have acquainted us with indirect eye lesions, by concussion or commotion (Lagrange,<sup>6</sup> von Szily,<sup>7</sup> Ammann,<sup>28</sup> Gallois,<sup>29</sup> Brueckner,<sup>30</sup> Davidson<sup>31</sup>), with the results of a world-wide preoccupation with detachment of the retina, leading to recognition of sudden eye movements in relation to vitreous mass movements and zonule tractions, in its genesis (Lindner,<sup>32</sup> Arruga,<sup>33</sup> Csapody,<sup>34</sup> Vogt<sup>8</sup>); and with reports of iridodialysis from a flash of strong light (Mandicevski<sup>35</sup>). Wagenmann as early as 1915 admitted that with the classical approach the subject is far from closed. The postwar current notion is best expressed by Vogt, who likens the effects of eye contusion to those of brain concussion, where the notion of compression is secondary. He resorts to the term *Schleuderbewegung*; that is, of the relative movement of constituent parts against each other: of the heavier against the lighter ones; of the iris against the lens, producing Vossius's ring, lens against vitreous making for subluxations, vitreous against retina for macular hole, and retina against choroid for Berlin's opacity. Frenkel's notion of the displacement backward and rebound of the lens on an equatorial axis is more in keeping with these more modern views, and is supported by slitlamp observation.

Some problems in the mechanism still require further study. There is the

visceral factor, namely, the state of a living functioning organ at the time of the injury: the state of the pupil; the state of accommodation; that of tension, as well as the various reflexes: lid closure reflex (Gradle<sup>27</sup>), reflex hypotony (Greenwood<sup>36</sup>), and vasomotor reflex (Gallois<sup>29</sup>). It would seem reasonable to expect a different response in eyes with tense zonule or advancing vitreous from that in eyes with retreating vitreous or relaxed zonule in relation to accommodation. Occasionally, in perforating injuries of the cornea, the lens capsule is injured at a point near the equator, the perforation not passing through the iris, indicating that the iris had gotten out of the way; that is, that mydriasis occurs equally with miosis in eye injuries.

The anterior-segment traumatic syndrome is much more common than the posterior-segment traumatic syndrome, which has been observed only ten times in the same period of observation as the injuries reported in this series, and is not often complicated by posterior-pole lesions, found only in about 20 percent of cases.

While traumatic iridoplegia is the most easily demonstrated lesion, the others have to be looked for. Their observation in about half of all cases, although in varying combinations, indicates that if they were more carefully searched out they would probably be found even more frequently.

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## THE FLUORESCENT LAMP FOR CATARACT SURGERY

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Long-wave ultraviolet rays cause the crystalline lens to fluoresce. This phenomenon is helpful in cataract surgery because of the sharpness with which the lens surface and cortical particles may be seen. Short-wave ultraviolet rays are absorbed by the cornea and cause a photochemical reaction. With a suitable filter the fluorescent lamp may be used for ultraviolet therapy. Other filters make the lamp useful in photography of the eye. From the Department of Ophthalmology, Washington University School of Medicine.

Since its introduction two years ago, the fluorescent lamp has gained an increasing amount of interest. Its use in the treatment of the dislocated lens alone is restricted because of the infrequency of this type of case, but in such cases the lamp is invaluable. Its use has extended into other phases of ophthalmology because of the fact that the carbon arc is itself a very rich source of radiant energy in the solar spectrum. With filters one may select certain bands of the spectrum for specialized use, as in photography, red-free ophthalmoscopy, and fluorescence. More recently the lamp has been used for treatment purposes with a condensing lens made of special glass, which permits biologically active ultraviolet rays to be transmitted. One further use has passing interest for the ophthalmologist: since teeth fluoresce brilliantly, whereas porcelain and other filling materials do not, and since dead teeth seem not to fluoresce well, the dentist may find the lamp a distinct aid in his diagnostic work.

Acting as gateways, filters screen out most of the light produced in the arc and allow only a narrow part of the spectrum to be transmitted. The fluorescent filter illustrates this well; it allows a pale violet light to come from the lamp, in addition to an intense beam of long-wave ultraviolet light, but it screens the rest of the visible light and the heat rays. A beam of the long-wave ultraviolet ray is invisible to the eye, but, directed on to a substance with fluorescent properties, it causes the substance to glow. The visibility is derived not from the violet light itself but from the invisible ultraviolet rays. The property is a physical one and is shown by many substances, but in

the eye it is shown only by the crystalline lens.

For treatment a different part of the spectrum is required, the short-wave ultraviolet-light rays which cause sunburn. The carbon arc is rich in these rays but to condense them a special glass lens is required, and also a special filter that is transparent only to the shorter waves. The short-wave ultraviolet ray produces in the body what is known as a photochemical reaction; it has some effect on atomic structure and causes very definite biological changes in the body. In the eye, burning, redness, photophobia, and lacrimation occur several hours after exposure. When an animal eye is exposed to short-wave ultraviolet light and several hours later is sectioned the microscopic picture is specific and shows a condition which can always be recognized as one due to ultraviolet light.

In its present form the lamp consists of an arc chamber to which is fitted a condensing lens and filter. Focusing is accomplished by screwing the lens back and forth. The filter is held in a fairly large fiber ring which is easily removed when a change in filters becomes necessary. The lamp operates best on direct current but can also be used satisfactorily on alternating current. Carbons used for projector purposes burn most steadily and quietly and are generally best, in fluorescence as well as in photography. The supply of long-wave ultraviolet is ample with these carbons. For treatment there is available a therapeutic carbon which furnishes more short-wave ultraviolet in its spectrum and therefore is much more effective. The amount of long-wave ultraviolet rays is not increased, and since these carbons do not burn so

quietly and steadily as the projector carbons, they are not to be recommended for general use.

Other sources of ultraviolet light have been investigated in an attempt to build some simpler form of lamp. Each of them failed to meet requirements in intensity; hence, in spite of its bulkiness and heat, the carbon arc must be used. As to harmful rays coming from the lamp, one may state that there is a small amount of heat, but the amount was found to be too low, both clinically and experimentally, to be of any significance.

### Lens surgery

The chief value of the lamp lies in its use in cataract surgery. The surface of the crystalline lens and its outline is shown by this instrument with a clarity not obtained in any other way. Particles of cortex and lens capsular remnants stand out clearly in the anterior chamber, and may therefore be easily removed. When one grasps the capsule during intracapsular extraction, its surface is so clearly demarcated that it is possible to discern the extent of the bite in the capsule forceps, and thereby an adequate hold is assured. If the capsule ruptures, the difficulty is easily seen at once and shows that further attempts at intracapsular extraction are useless. When capsulotomy is purposefully performed, the outline and extent of the capsule tear are shown. During expression of the nucleus or lens in capsule, the glowing mass stands out in striking contrast to the other parts of the eye. Some surgeons, however, prefer to have the ordinary operating-room light during this step. After extraction of the lens any cortical remains in the anterior chamber may be removed by irrigation. The capsule itself does not fluoresce, but adhering to it there is a layer of cortex which makes the capsule easily visible under close observation. The writer has been able to detect small particles of capsule in the wound by means of the fluorescent lamp, remnants invisible under ordinary white light.

The lamp should stand beside the operating table with the end of the tube

about one foot from the patient's eye. With the lens tube screwed in, a beam about one inch in diameter floods the eye. Blood in the anterior chamber naturally obscures a view of the lens, as it does under any other form of illumination, and it should be irrigated away.

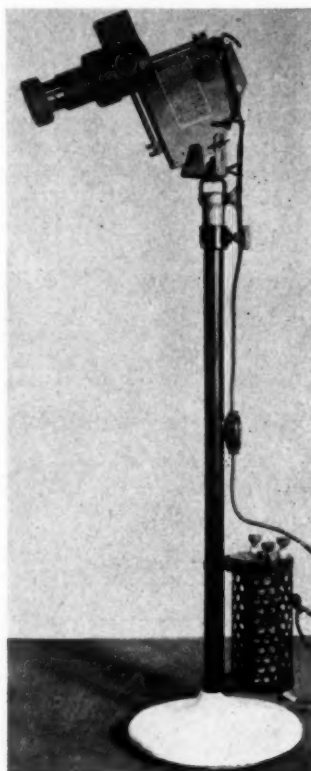


Fig. 1 (Hildreth). The fluorescent lamp.

In case the lens should become dislocated into the vitreous during the operation, it can be readily seen and removed. If the dislocation is deep into the vitreous, the position of the lamp can be changed so that the beam is aimed towards the surgeon's head and reflected into the patient's eye by means of a head mirror either in position before the surgeon's eye or raised above it.

### Therapy

Short-wave ultraviolet light is absorbed almost entirely in the surface layers of the eye, the conjunctiva, and the cornea. The short-wave ultraviolet



rays alone are active biologically and since ultraviolet light acts only in the tissues in which it is absorbed, it is useless to attempt therapy inside the eyeball. The long-wave ultraviolet rays pass readily through the cornea, but are absorbed in the lens and reconverted into visible light, producing fluorescence. Under clinical conditions no ultraviolet light reaches the retina, and hence there is no danger of damage to that tissue. The little heat coming through the short-wave ultraviolet filter is too small to be of any harm to the retina under clinical conditions.

Since external diseases alone are suitable for treatment, in general it is be-

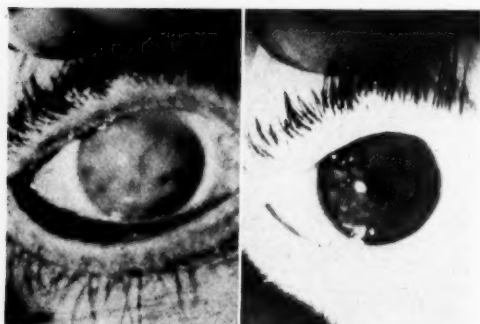


Fig. 2 (Hildreth). The photograph on the left, taken by white light, illustrates the opaqueness of the cornea as seen clinically. On the right is the same eye photographed by infrared rays.

lieved that corneal ulcers are the most common conditions that can be helped by the lamp. Almost any form of corneal ulcer will respond to ultraviolet irradiation, and there seems to be no contraindication restricting use in this type of ocular disease. The reader is referred to the extensive literature on this subject. In Duke-Elder's book, "Recent advances in ophthalmology," the subject is briefly but excellently presented with a full bibliography.

In therapeutic use of the lamp, the short-wave ultraviolet filter must be in place, and the glass lens that is transparent to the short-wave ultraviolet rays must be substituted for the ordinary glass lens. In addition, the therapeutic carbons must be inserted. If the electric supply is an alternate current,

the dosage will be longer than if the current is direct. Direct current gives a more intense beam of radiant energy from the lamp, but the therapeutic carbons burn more smoothly on A.C., and therefore the dosage is only about one third longer. From experimentation and clinical experience the writer recommends one-minute dosage with D.C. and one-and-one-half minutes with A.C. The carbons should be adjusted so that the light is as strong as possible.

The patient should be steadied by a head or chin-rest. If the eye is extremely sensitive, it is best to have it slightly anesthetized. The visible light from the lamp is so dim that it causes little or no discomfort to the patient, but a small amount of pantocaine may be used if desired. The lamp should be brought close to the eye and the lens extended fully, so as to give a short focus. With this adjustment the field will be about the size of an average cornea, which is an area not too large to expose at once. With the above-recommended exposure most patients will experience a mild photophthalmic reaction in from six to eight hours. A cold compress usually will give sufficient comfort so that rest can be secured during the night.

### Photography

For clinicians who like to do their own photography the lamp offers certain advantages as a source of illumination, with a blue-glass filter. With this filter the brightness of illumination is not great, and consequently there is little discomfort to the patient; even inflamed eyes will stay open easily. Light from ordinary sources for photographing the eye is very bright, and in working quite a hardship on the patient, makes photography difficult. Although the blue light is not intense from the patient's standpoint, it is very active on the photographic film or plate, and snapshot exposures are successful. The blue monochromatic light prevents all chromatic aberration, no matter what camera lens is used; because of this fact the picture is of high quality and detail is very sharp.

One other type of photography that

is fascinating but not of general application is the taking of pictures by infrared light on infrared plates. Infrared rays have the power of penetrating media through which ordinary light does not pass and consequently when using a plate sensitive to infrared rays one can get pictures of the iris through an opaque cornea. A filter supplied for the lamp removes the ultraviolet and visible light but allows the infrared rays to be transmitted. With this intense source one can get pictures by snapshots. The degree of radiation is not troublesome at all to the patient, for it is concentrated on the eye, and the exposure time is short. Such pictures, of course, are valuable in an attempt to restore sight by such an operation as a

corneal transplant; also, they may have some utility in medico-legal work.

There remain other uses for the lamp, their value depending somewhat on one's personal interest and enthusiasm. With a filter that transmits in the green, the lamp is an excellent source for red-free ophthalmoscopy; the writer has used this by means of the reflecting ophthalmoscope and also the binocular ophthalmoscope. The greatest value of the lamp, however, lies in the field of lens surgery. While it is not intended that fluorescence should take the place of ordinary light, still it does have certain advantages that no other form of illumination can supply.

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### A CRITICAL SUMMARY OF SURGICAL EXPERIENCES IN 1934

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This review of operations performed by members of a department of ophthalmology in a medical school during one year does not lend itself to abstracting. From the Department of Ophthalmology in the Medical College of Virginia. Read before the Pan-American Medical Association in July, 1935.

There are many statistical reports in the literature, dealing with the results of a series of operations, cataracts for example; and there are annual hospital reports, recounting the number and variety of operations done in a calendar year, which nobody reads; but there are not many critical summaries of the surgical experiences of a clinic, the relative frequency of the ophthalmic operations in a certain locality, and a discussion of the problems arising and results obtained in such an experience. The present communication aims to present such a report, discussing the experiences of the ophthalmic staff of the Medical College of Virginia during the year 1934, in both private and clinic practice, in the hospitals of the Medical College of Virginia, and in several other hospitals in Richmond. The surgeons who have collaborated with us and generously allowed us to use their records are Drs. Neilson H. Turner and Rudolph Thomason of Richmond, and Dr.

Frederick O. Fay, our late Resident, now of Wilmington, North Carolina.

This report offers nothing new and makes no boasts. Its excuse is the belief that any surgical material honestly handled and honestly reported, though small in volume, will suggest problems of technique, of surgical judgment, and of economy and efficiency; and that by comparison of types of case, relative frequency of the various ophthalmic diseases, and racial and social factors, we may reinforce and correct, here and there, each the other's impressions and convictions.

The majority of private patients have been cared for in the Johnston-Willis Hospital, a smaller number in the Memorial (white) and St. Philip (colored) Hospitals of the Medical College of Virginia, and one each in the Stuart Circle and St. Luke's Hospitals through the courtesy of the staffs of these latter two private institutions. The private patients total 107; the remaining 132

patients were in the wards of the teaching hospitals of the Medical College of Virginia (Memorial and St. Philip).

**Table 1**

OPERATIONS PERFORMED IN 1934

Cataract extraction, senile .....	64
Capsulotomy for secondary cataract ....	34
Preliminary iridectomy .....	4
Iridotomy .....	2
Cataract extraction, juvenile .....	3
Cataract extraction, traumatic .....	4
Needling congenital cataract .....	11
Iridectomy for occluded pupil .....	2
Delivery of dislocated lens .....	3
Glaucoma operations .....	38
Enucleations .....	24
Operations for detached retina .....	4
Repair of perforating wounds .....	9
Magnet extractions .....	2
Squint operations .....	9
Tumors of conjunctiva .....	4
Operations on tear passages .....	14
Miscellaneous .....	8

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**Cataract extraction**

**Preliminary study.** All cases are studied medically, with special reference to focal infections. This study includes a dental examination. We regard apical abscesses about the teeth as a most positive contraindication to a cataract operation. When the patient is as free of infections as can be and if his blood pressure is not unduly high or can be reduced by rest in bed, when he has no marked orthopnea, violent cough nor urinary obstruction we are willing to operate. Diabetes is not considered a contraindication if it can be controlled by diet and insulin before operation.

We follow this general rule as to the time of operation: when the better eye (from the standpoint of the lens changes) is no longer good enough for the patient's needs in his occupation, we operate on the other eye (the eye with the more mature cataract). This means that we seldom have a mature cataract in private practice, because the occupational needs of these patients preclude the long wait to which the less fortunate clinic cases are subjected, especially the negroes. This delay is due in part to the general neglect of the aged poor, but also in part to the antiquated advice too often given them before they

reach our clinic, that they must wait until the cataract is "ripe."

**Preparation of the eye.** As to the condition of the eye itself, aside from the cataract, we eliminate active inflammation, including the conjunctiva and tear-drainage apparatus. We do not make cultures nor smears if the conjunctiva shows no secretion nor hyperemia. This may be heresy to some surgeons but we have had no occasion to repent of it. We use  $\text{AgNO}_3$  the day before operation, and irrigate with boric-acid solution the night before and the morning of operation. Atropine is instilled following these irrigations. We operate in the early morning with few exceptions. At the time of the operation considerable attention is paid to mechanical cleansing.

We have tried several kinds of sedatives. Fearing the tendency of morphine to cause nausea and vomiting, we avoided it for a long time. Then we used the so-called "twilight sleep," morphine and hyoscine, usually 1/6 gr. of morphine and 1/200 gr. of hyoscine. This has gradually been abandoned because of the occasional idiosyncrasy for hyoscine and the occasional vomiting which has followed the use of these drugs. We cannot say that harm has come from this vomiting except in one case. It is not violent but rather like the drooling of the infant whose food disagrees with him; but we have found that negro patients are excited by these drugs and we have abandoned them entirely for these patients. We have had poor success with the barbituric-acid preparations. For a while we used sodium amytal and luminal, but they were unsatisfactory, producing an irritability and restlessness, especially in negro patients, which led us to abandon these drugs. We now use, almost invariably, a combination of sodium bromide and chloral hydrate, usually 15 gr. of each, the night before and again one hour before operation. These have proved to be most innocent sedatives, leaving no untoward effects.

**Anesthesia and akinesia:** We use cocaine, 4-percent solution, for local anesthesia, adding a subconjunctival injection for further anesthesia of the iris.

We inject two or three drops of adrenalin subconjunctivally at the lower limbus to insure dilatation of the pupil after the anterior chamber is emptied. One of us (R. H. C.) suggested this technique several years ago. We have found it of great help in maintaining a dilatation of the pupil below, so that capsule forceps can be made to grasp the anterior capsule below the anterior pole of the lens, as Knapp recommends.

Formerly we used the Van Lint method of akinesia. In recent years we have substituted the O'Brien<sup>1</sup> method of blocking the facial nerve as it passes through the parotid gland, with 2-percent novocaine and adrenalin.

Since April, 1934, we have practiced retrobulbar injection of 4-percent novocaine (1 c.c.) and three minims of adrenalin. We had previously used (and still do) retrobulbar injections of 2 c.c. of 1-percent novocain and adrenalin to secure anesthesia and reduce tension in glaucomas, but we had not used this procedure in cataract operations. After conferring with Dr. Aaron Green,<sup>2</sup> of San Francisco, we introduced his method which we have consistently employed since April 11, 1934. The deeper anesthesia and the reduction of tension by the vasoconstrictor action of adrenalin are utilized, but the proptosis sometimes caused by a large amount of fluid injected into the orbit is avoided by using a smaller amount (only 1 c.c.) of a stronger solution\* (4-percent novocaine). The results have been uniformly good: profound anesthesia and a soft eye in which the cornea is usually indented after the incision is completed. We are aware of theoretical objections to this procedure; we can only say that we have seen no harm from it, and we are quite confident that we have saved several eyes which could not have withstood the excessive manipulation demanded in removing complicated cataracts, unless the tension had been

greatly reduced and the anesthesia profound (table 2).

Table 2

## 64 CATARACT EXTRACTIONS (SENILE)

## COMPLICATIONS:

*Preoperative:* (Delaying or modifying operation) Abscessed teeth (11); high blood pressure (6); obesity (2); deafness (2); dacryocystitis, glaucoma (secondary to endophthalmitis phacoanaphylactica), arthritis, convergent squint (amblyopia), high myopia, symblepharon, poor light projection, renal calculus requiring nephrectomy, asthma, epilepsy (each 1).

*On the table:* loss of vitreous (slight), 4 cases; bulging of wound (2); inability to look down (2).

*Postoperative:* vomiting (4), morphine and hyoscine used; incarceration of iris (2); glaucoma (2); temperature 5th day, and uveitis 10th day (1); retention of urine, intraocular hemorrhage, abscess of cornea, detachment of choroid (reattached spontaneously), cystitis, influenza, obstinate cough, asthmatic attacks, iritis, mental unbalance, hyphemia, uveitis (probably sympathetic, empty anterior chamber, 9 days (each 1).

Of these complications four were destructive of vision: (1) fever and uveitis, (2) intraocular hemorrhage, (3) abscess of cornea, (4) sympathetic (?) uveitis.

Enucleation has been performed in one of these cases.

Death followed in one case (heart attack) twelve days after successful operation.

## VISUAL RESULTS:

	Cases
20/15-20/20 .....	18
20/25-20/30 .....	15
20/40-20/70 .....	13
20/100-20/200 .....	5
Less than 20/200 .....	5
Death .....	1
Unknown .....	7 (all clinic)

**The operation.** An attempt is made to carry out the Knapp<sup>3</sup> technique, but we do not usually make intracapsular extractions. This is no doubt due to timidity. We would suggest, however, that the Knapp technique for intracapsular extraction is a very satisfactory technique for extracapsular extraction. A small corneal incision is made with the object of getting a conjunctival flap. We are unable to make a large enough corneal incision with the Graefe knife, with the accuracy desired; therefore a

\* It is difficult to say just who is responsible for this technique. Duverger (*Anesthésie locale en chirurgie orbito-oculaire*. Presse Médical, 1918, Aug., p. 408) seems to have popularized it in France and the Greens in the United States, especially in the matter of dosage (4 percent novocaine).



small incision is made and enlarged with scissors until somewhat more than one half of the cornea is circumcised. In our opinion a large corneal section is of paramount importance. We seldom take a stitch. We practically always make an iridectomy. An intracapsular extraction is not attempted in the majority of our cases, for various reasons, but partly because of our long experience with the extracapsular operation and our feeling that we can best serve our patients by doing the operation with which we are most familiar. In nearly half of our cases we attempted an intracapsular operation, using the Kalt or Arruga dull capsule forceps, attempting to follow Knapp's technique, making counter pressure at the lower limbus with the hook, grasping the capsule below the anterior pole of the lens, rocking the lens, attempting to rupture the zonule below, allowing the lens to tumble, and finally breaking the zonular fibers above. We are perhaps too timid in this technique. More often the capsule is torn before the zonule breaks; but in our experience the large capsulectomy thus obtained and the large corneal incision (with scissors) make it possible to get better extracapsular operations than by any other method. Of thirty-two attempted intracapsular operations, in our series during 1934, nine succeeded. We acknowledge that the attempts were somewhat half-hearted.\*

As a precautionary measure the speculum is replaced by the Green lid elevator after the incision and iridectomy. We feel satisfied, as Green says, that any pressure on the lower lid tends to make the wound bulge (a fact easily demonstrated by using the finger), and therefore we let the lower lid alone.

In a few cases the anterior chamber was irrigated with half-normal sodium-chloride solution. This maneuver and the details of wound toilet are gauged by the behavior of the patient and the state of the wound. Regularly atropine

is used and White's ointment; surgeon's silk plaster holds the lids closed after the facial nerve has been blocked.

We usually make the first dressing on the third day, and leave the fellow eye open if the anterior chamber has reformed.

We have an understanding with the nursing authorities to the effect that every ward patient shall be provided with a pupil nurse, both day and night, from the time of operation until one eye is left open. This, to our knowledge, is an exceptional provision for ward cases, and we refer to it with pride. It means that the poorest negro brought in from the rural districts of Virginia, sleeping in a strange bed for the first time in fifty years, with both eyes covered, and frightened out of his wits, has as good a chance to recover without mishap from a cataract operation as has the well-to-do private patient.

Our difficulties, complications, and results are about as usual in such statistics. Of 64 patients, 7 have disappeared from view and one has died; of the remaining 56, 51 are benefited, 46 having very useful vision, and of these 33 have excellent vision.

Slightly more than one half of our senile-cataract patients required a needling of the posterior capsule.

Linear extractions, without iridectomy if possible, were performed in cases of juvenile and traumatic cataracts. The needling operation was used in congenital cataracts. We regard the Ziegler knife-needle as an extremely useful instrument, but insist upon the proper instrument, properly sharpened, and this is not always easy to obtain. Atropine and dionin are used for several months before the needling is repeated, in the belief that absorption goes on for a long time, and the total number of operations will be reduced if we are not too impatient.

#### Operations for glaucoma

According to type of glaucoma. We prefer the iridectomy of Von Graefe for acute glaucomas. This operation was performed on five eyes with primary acute congestive glaucoma, one eye with acute glaucoma due to a posterior

\* Since 1934 we have modified our technique somewhat. We do not use atropine always before operation; we attempt simple extractions more often; and we practice more liberal irrigation of the anterior chamber in cases of extracapsular extraction.



dislocation of the lens (the lens being removed at a subsequent date, since iridectomy relieved tension only temporarily), and one eye with chronic congestive glaucoma. Trephining, with peripheral iridectomy, was performed on two eyes with acute glaucoma superimposed upon secondary chronic glaucoma (uveitis).

We are unable to find satisfactory evidence that any other operation equals the basal iridectomy of Von Graefe in the recent case (within a week of the onset of the first attack), and we prefer to avoid any further surgical manipulations. When an anterior synchia is of longer standing, whether tension has been high enough to cause a congestive reaction or whether the eye has remained in the noncongestive (simplex) state, the method of operation is selected according to the degree of tension, in part, but even more according to the field of vision. We believe that higher tensions and moderately wide fields demand an operation which secures a filtering cicatrix. On the other hand, we believe that slight elevation of tension can be controlled by lesser measures and that very narrow fields contraindicate operations which involve cutting the iris. With these criteria in mind we have performed the Elliot trephine operation on fourteen eyes, of which four were of the subacute or chronic type, six had glaucoma simplex, and four secondary glaucoma. In all of these cases complete iridectomies were performed but only peripheral iridectomies in the cases of acute glaucoma submitted to the Elliot<sup>4</sup> operation (see foregoing paragraph). We are not prejudiced for or against the types of iridectomy; these are taken as they come; in our cases upon trephining, there has usually been tension high enough to cause considerable prolapse of iris through the trephine hole and therefore complete iridectomy has logically followed.

The Lagrange<sup>5</sup> sclerectomy was done twice. These two eyes had deep enough anterior chambers to admit of the use of the Graefe knife, which was not usually the case in this series. The chief explanation of the paucity of Lagrange

operations, however, is that our experience has been much larger with the Elliot operation and, whether inherently easier or not, the latter is the easier operation for us.

Iridotaxis has been performed six times and iridencleisis twice, the types being chronic congestive glaucoma in three eyes, simple chronic in four, and secondary glaucoma in one. The indications were narrow field or blindness, only moderate elevation of tension and, in one case, high blood pressure. We are, of course, aware of the theoretical objections to iris-inclusion operations, but we have yet to see any harm come from them. They are easier to perform than most of the operations for the relief of tension, and they obviate enucleation in many cases. We are strongly inclined to advocate their wider use. As to the relative value of the two methods, iridotaxis and iridencleisis, we have no opinion. As stated in regard to the two chief sclerectomy operations, our experience has been chiefly with one (iridotaxis), through the influence of Drs. Harrower<sup>6</sup> and Wilder,<sup>7</sup> and we have not given the other method (iridencleisis) sufficient trial to justify a comparison. In one case of iridotaxis we were chagrined to find the next day that the iris had slipped back, leaving only a small knuckle in the wound. This was apparently due to too large a keratome incision, which we have recognized as the chief fault to be avoided in this operation.

Cyclodialysis alone was done four times (three times for glaucoma simplex and once for glaucoma secondary to cataract extraction), and cyclodialysis with iridectomy (Wootton<sup>8</sup>) twice for simple chronic glaucoma. The latter procedure is plausible and should theoretically be valuable (like the Jervoy<sup>9</sup> operation). We were not especially impressed by our experience with it, but no conclusions should be drawn from two cases. The indications for cyclodialysis were very narrow fields with only moderate elevation of tension, atrophic iris, and glaucoma due presumably to lens capsule blocking the anterior-chamber angle after cataract extraction. We are not sure as to the

mechanism of the relief of tension after this operation and have some apprehension of the danger of bleeding and temporary elevation of tension, but are inclined to continue to employ the operation in selected cases.

Our results have been fairly satisfactory. Acute primary glaucomas give uniformly good results if a basal iridectomy is done promptly. Subacute and chronic congestive cases have remained quiet with one exception, and no enucleation has been necessary as yet. Where vision of 20/200 or better existed at the time of operation, with a moderate field, improvement has occurred (20/70 to 20/25) with widening of the fields in seven cases. In general, we are satisfied if the process is checked even if not improved. In so protean a disease, occurring usually in the elderly, we cannot prevent further senile changes, and indeed we probably hasten them by operation. We believe that cataract is hastened by many glaucoma operations, especially the Elliot trephining.

#### Operations on the tear passages

We see fewer cases of chronic dacryocystitis than formerly. Early care of epiphora (which usually means simply dilating the puncta a few times) will often prevent this infection. When the obstruction is at the nasal end of the duct, repeated probings and injections of lipiodol, which has a favorable influence on the periductal lymphoid tissue, will often secure a patent duct. We are not impressed by the claims of persistent tearing after the removal of the sac, and we have seen no reason to resort to the various operations suggested as substitutes for excision of the lacrimal sac. We perform the latter operation if possible; if clean dissection is not possible, because the infection has already extended outside the sac, we cauterize with phenol or trichloroacetic acid.

The congenital obstructions seen in children usually yield to one probing. We ordinarily do this in the hospital, under general anesthesia. We have done it twice in the office. It is a question whether a baby is more disturbed by

anesthesia or by probing without anesthesia. We find a tendency among the pediatricians to postpone operation on the grounds that spontaneous recovery is likely to occur. This question needs investigation. Our impression is that spontaneous recovery is rare; but it may be that we see only the minority of cases in which there was no recovery.

#### Operations for squint

We regard surgical correction of squint as a last resort, except when young children have so high a degree of strabismus that one eye is practically out of commission because the image falls far away from the macula. In these cases we advise early operation, but see few of them. We nearly always operate for cosmetic purposes alone. Of all the methods tried we regard the Jameson<sup>10</sup> procedure as the most satisfactory operation on a single muscle. It has all the virtues of tenotomy without its disadvantages and uncertainties. We modify the Jameson procedure slightly according to the suggestion of Frederick A. Davis<sup>11</sup>; that is, we make the conjunctival incision opposite the site of the intended recession and suture the conjunctiva separately. This seems to make a neater wound and less post-operative reaction, and in no way detracts from the very great value of the recession. We would commend especially the Jameson needle, which we regard as by far the best needle ever devised for squint surgery. When a recession is inadequate, a Reese resection and advancement are added. The recession is performed first and then the Reese operation, so that all tension may be relieved from the sutures holding the advanced muscle. In two cases, because of very scant muscle tissue, we have advanced Tenon's capsule, using whatever device we could and not following any definite technique.

Our series is small, because we are very conservative in advising operation; but our results are satisfactory. One of nine cases definitely requires a second operation (as was predicted from the beginning) and another probably will. The other seven are perfectly satisfactory. We are aware that some

surgeons favor early operations. We simply cannot agree with the enthusiastic advocates of this practice.

### Tumors of the conjunctiva

We have been interested in a type of small pigmented growth of the conjunctiva (only one in this series) which we have seen several times. All have been benign clinically (no recurrence in some years—two cases over ten years) and all pronounced epithelioma by competent pathologists. They occur in children, give no trouble except that they are disfiguring, are freely movable and easily dissected out. Perhaps they are recognized and removed earlier (because they are disfiguring) than other similar tumors and therefore impress us as benign.

The fourth case, a malignant tumor, presented a problem. We obtained permission for enucleation in case the frozen sections showed malignancy, and then decided to preserve the eye. The growth was easily dissected off, the eye had good vision, and we felt justified in using radium, with the understanding that the patient will remain

under observation and permit enucleation if there is any suspicion of recurrence.

### Retinal detachment

We are encouraged by the good results obtained in recent years by various procedures used to secure reattachment of the retina. We had no success with the Gonin method. The Guist-Lindner<sup>12</sup> operation gave us several successes after we had come to regard this condition as perfectly hopeless. The electrocoagulation (diathermy) method is easier to perform and causes less trauma. We have had three recoveries in the past year in four cases attempted. One is not materially benefited. Retinitis proliferans followed retinal hemorrhages and although the immediate results were encouraging and the retina is largely attached now, vision is no better. This was a case of high myopia and operation was a last desperate resort. Many factors enter into this problem which are not yet settled. The remote results of such manhandling of delicate tissues have yet to be seen.

Professional Building.

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## MENINGOCOCCUS CONJUNCTIVITIS FOLLOWED BY SEPTICEMIA AND BEGINNING MENINGITIS

### (A case report)

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This case of meningococcus conjunctivitis followed by a meningococcus septicemia and aborted meningitis is reported for the reason that it presents an unusual sequence of events and indicates that the conjunctiva may serve as a portal of entry for the meningococcus. From the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital.

Before the use of antimeningococcus serum, meningococcus conjunctivitis as a complication of cerebro-spinal meningitis was well known. Randolph,<sup>1</sup> in 1893, quotes Hirsch and Ziemssen and Hess as finding it as an invariable concomitant. McKee, in 1908<sup>2</sup> and 1909,<sup>3</sup> isolated and positively identified the organism in the conjunctiva of three patients with cerebro-spinal meningitis, and in 1913,<sup>4</sup> found the organism in the bacterial flora of a normal eye. Following the therapeutic use of antimeningococcus serum, conjunctivitis has become a rare complication, being absent in 66 cases reported by Lewis<sup>5</sup> in 1931, and occurring only once in the large series reported by Tillett and Brown<sup>6</sup> in 1935. Gifford and Day,<sup>7</sup> in 1935, reported an isolated case of meningococcus conjunctivitis unassociated with any general symptoms.

McKee,<sup>2</sup> in 1908, raised the question as to whether meningococci in the conjunctiva were secondary to their presence in the nose, or if the conjunctiva itself might be an independent portal of entry. In 1904 Koplik,<sup>8</sup> reporting 77 cases of cerebro-spinal meningitis, reported one case in which there was a definite history of conjunctivitis antecedent to the general symptoms of meningitis. A year later, Dorland Smith<sup>9</sup> reported a case of meningococcus conjunctivitis occurring in a nurse who had been exposed to epidemic meningitis. The organism was identified by cultures. The conjunctivitis cleared up, after a few days, with local treatment and cerebro-spinal meningitis did not develop.

Tillett and Brown reported that the mode of onset in their cases of meningitis fell into three well-defined types:

1. Cases with upper respiratory infection of one to three weeks' duration before evidence of meningitis. 2. Cases with the onset accompanied by upper-respiratory-tract symptoms, but differing from the first group in a more severe and abrupt onset. 3. Cases with sudden and sometimes explosive onset, the symptoms being directly and primarily those of meningitis, without any preceding history of nose-and-throat infection. Only three patients in their series were admitted on the first day of the disease and this patient was one of them.

### Abstract of case history

L. S., a nurse, aged 19 years, complained that she "awoke in the morning with a red, uncomfortable right eye." The family history was noncontributory. Her general health had always been excellent. She had had the usual childhood diseases and an appendectomy in the fall of 1934. Otherwise there were only occasional mild colds.

Present Illness. The patient awoke at 6 a.m. with a red, uncomfortable right eye, otherwise feeling generally well. She came to the accident room of the Wilmer Institute at 9 a.m., at which time examination revealed a mild conjunctivitis manifested by marked redness of the conjunctiva, a thin, seromucoid discharge, and slight edema of the lids and conjunctiva of the right eye. The cornea was clear. The interior of the eye was normal. The left eye was free from inflammation and normal in appearance. Argylol, followed by 2-percent boric-acid solution irrigations every hour, was ordered. She returned at noon, complaining that the eye was worse. The edema of the lids and con-



conjunctiva was more marked and the discharge more copious and muco-purulent. Smears and cultures were taken. The smears showed a gram-negative, intra- and extracellular diplococcus. Further questioning revealed that the patient had been on duty with a case of epidemic meningitis in the Harriet Lane Home.

The patient was immediately admitted to the hospital and half-hourly treatments to the eye were started. During the afternoon, general malaise, headache, and backache developed. By 4 p.m. she was quite ill, and an hour later a chill of moderate severity occurred. The white count at this time was 13,800 with 90 percent of polymorphonuclear leucocytes. The patient was transferred to the isolation ward of the medical service. A general physical examination at 6 p.m. was as follows: Temperature—103.8°, Pulse—134, Respirations—24, Blood Pressure—90/60. The patient was restless and apprehensive, but rational and quite cooperative. A few scattered, pale, rose-colored lesions about 3 mm. in diameter were seen in the skin. A large subconjunctival hemorrhage was present in the right eye. The lids were swollen shut with a copious muco-purulent discharge. The cornea was clear. The left eye was normal. There was slight nasal congestion, but no discharge. The tongue was heavily coated and the pharynx injected. The neurological examination was negative. The blood was normal except for the leucocytosis. The urine also was normal and the spinal fluid clear, under normal pressure, with no increase of cells.

The patient was found to be sensitive to horse serum and had to be desensitized. Ten cubic centimeters of polyvalent antimeningococcus serum was then given intravenously during the evening. The temperature dropped from

105.6° at midnight to 101.0° at 4 a.m. During the first night, treatments to the eye were continued. On the second day the eye was markedly improved and treatments were decreased to one every two hours. A small retinal hemorrhage developed in the left eye. During the second day, 30 c.c. of the serum were given intravenously in three doses of 10 c.c. each, and on the third day an additional 10 c.c. On the third and fourth days, definite resistance of the neck to flexion and a positive Kernig developed. These signs of meningeal irritation disappeared on the fifth day and did not return. The patient now gradually improved, except for a mild serum sickness on the ninth day.

The cultures taken from the conjunctiva, nose, throat, blood, and spinal fluid all showed the meningococcus which agglutinated types I-III. The patient never developed a classical meningitis, although the meningococcus was present in the spinal fluid.

This case is of special interest for the reason that the conjunctival sac was apparently the portal of entry for the infecting meningococcus. The patient, a student nurse, had been exposed to epidemic cerebro-spinal meningitis, but had worn the usual protective mask, and there were at no time upper-respiratory-tract symptoms. Whether the organism entered the blood stream directly from the conjunctiva or from the nose after passing down the lacrimal canal, could not be determined.

### Summary

A case of meningococcus conjunctivitis followed by meningococcus septicemia and an aborted meningitis is reported. The evidence in this case indicates that the conjunctiva was the actual portal of entry for the infecting organism.

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## STAPHYLOCOCCUS TOXIN COMBINED WITH LENS EXTRACT AS A DESENSITIZING AGENT IN INDIVIDUALS WITH A CUTANEOUS SENSITIVITY TO LENS EXTRACT

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Lens extract, when combined with staphylococcus toxin and injected intracutaneously, first sensitizes and then desensitizes the rabbit to lens extract. Injection of lens extract alone does not produce this effect. Because of this synergistic effect of the toxin on lens extract, a mixture of lens extract and staphylococcus toxin was used to treat two patients with intraocular inflammation associated with cutaneous sensitivity to lens extract. Both patients lost the cutaneous sensitivity to lens extract after treatment and it is probable, but has not been proved, that the ocular tissues were also desensitized. From the Wilmer Ophthalmological Institute, Johns Hopkins Hospital and University.

In an earlier report<sup>1</sup> it was shown that rabbits subjected to repeated intracutaneous injections of lens extract and staphylococcus toxin developed a cutaneous sensitivity to lens extracts derived from the rabbit or other species of animals. When the lenses of these sensitized animals were needled, a marked intraocular inflammation developed. This ocular reaction resembled, clinically and histologically, endophthalmitis phacoanaphylactica in humans. If the cutaneous injections were continued over a relatively long period of time the cutaneous reactions to lens decreased and then became entirely negative. At this point, needling of the lenses produced only traumatic cataracts. Such sensitizing and desensitizing effects could not be obtained by the injections of lens extract alone.

On the basis of this observation—the synergistic effect of toxin on lens extract—we have used a mixture of staphylococcus toxin and lens extract to desensitize patients who showed a cutaneous sensitivity to lens extract associated with intraocular inflammation believed to be due to the absorption of lens protein in a hypersensitive individ-

ual. Two such patients have been thus treated. This method of treatment produced such striking changes in the cutaneous reactions to lens that it seems advisable to report the method used and the results obtained.

### Materials and Methods

Lens extract was prepared as previously described.<sup>1</sup> Staphylococcus toxin was prepared by inoculating a toxin-forming strain of staphylococcus to hormone bouillon and incubating at 37° C. for 10 days. At the end of this time, .5-percent trikresol was added and the culture filtered through a Berkefeld V filter. Necessary dilutions of the lens extract and the toxin were made in 0.85-percent sodium-chloride solution containing .5-percent trikresol.

The hormone bouillon was prepared as follows:

#### DIRECTIONS FOR PREPARING 15 LITERS OF HORMONE BOUILLON

##### A.

Fresh ground beef heart. (Do not remove fat before grinding.) . . . . 15 lbs.  
Eggs . . . . . 9  
Distilled water . . . . . 10 liters  
Stir the eggs in about one liter of water and then add to the meat and water.

Stir occasionally while the mixture is heated to 50°C.

## B.

Neopeptone (Difco) .....	150 Gm.
Sodium chloride .....	37.5 Gm.
Distilled water .....	5 liters
Bring to a boil and slowly add sheet gelatin .....	150 Gm.

When A has reached 50°C. add B. Stir thoroughly and bring to a boil. Do not stir after the first mixing. Boil ten minutes. Remove about 500 c.c. of fluid and filter through paper. Portions of 50 c.c. are placed in 100-c.c. beakers. To each beaker is added an increasing amount of N/1 HCl. Begin with 0.5 c.c. and increase by 0.25 c.c. to 1.5 c.c. One of these amounts of HCl will cause the maximum precipitate. An aliquot portion of HCl is added to the main portion of the mixture. Boil ten minutes. Strain through a colander. (Do not filter through any organic material.) Autoclave at 15 lb. pressure for 15 minutes. Pour into 6 liter jars and allow sedimentation to proceed for 24 hours at room temperature. The supernatant medium is siphoned off, leaving the fat and sediment behind. The pH is adjusted to 8.0 in the cold with N/1 NaOH and the volume is made up to 15 liters after the addition of the NaOH. Bring to a boil and pour into glass jars. In two or three hours the flocculent precipitate which has formed settles out. The supernatant fluid is siphoned off into large flasks and autoclaved at 15 lb. for 15 minutes. It is advisable to store these flasks for several days so any precipitate forming after the autoclaving can be removed by siphoning off the clear supernatant fluid. Repeated autoclaving will not affect this medium. If this broth is properly made it will support a luxuriant growth of gonococcus or meningococcus without the addition of any growth-promoting substances such as ascitic fluid.

This medium is a modification of the one described by Huntoon in the *Journal of Infectious Diseases* (1918, v. 23, p. 169). It differs from the one he described in that acid is added and the fat is not removed from the hearts. By the above method the acid first hydrolyzes some of the fat, forming glycerol and precipitated fatty acids. The NaOH then converts some of these substances into soaps. It is probable that the soap content differs from that in the ordinary medium.

The method for preparing hormone bouillon has been given in detail because there is considerable evidence that the medium and the method of toxin production is of importance. Since the publication of the earlier report,<sup>1</sup> several investigators have attempted to

repeat these experiments. In general, the results were not confirmatory until hormone bouillon or some modification of this formula was used.<sup>2</sup> In addition it is now definitely known that staphylococcus toxin produced in hormone bouillon differs markedly from that produced by other methods.

Cutaneous sensitivity to lens extract was determined by injecting 0.1 c.c. of beef lens extract, 1:100, into the volar surface of the forearm. A positive reaction was shown by the appearance of erythema and swelling in 24 to 48 hours after the injection. After the lens reaction was determined the patient was injected with 0.1 c.c. of staphylococcus toxin, 1:100, in the skin of the opposite forearm.\* According to the amount of reaction to the toxin after 48 hours, a treatment mixture of lens extract and staphylococcus toxin was prepared and injected intracutaneously twice a week. The further details of treatment are given in the individual case histories.

**Case 1.** A. W., a white male, aged 11 years, was admitted to the Wilmer Ophthalmological Institute on July 27, 1934, with a diagnosis of congenital cataracts, bilateral, after discissions in 1926 and 1928, elsewhere. Vision: O.D. = 5/200, could not be improved; O.S. = 20/200, with +5.00 D. sph.  $\approx$  +2.00 D. cyl. ax. 180° = 20/70. On August 3d and 10th, discissions, O.S., were performed. On August 11th, the tension rose in this eye. On August 13th, a paracentesis and lavage of cortex, O.S., were performed. The next day milk, injections were begun. On August 22d, iridectomy and lavage of cortex were done. On September 23d, an intracutaneous injection of lens extract, 0.1 c.c. in a dilution of 1:100, caused an area of erythema and swelling 3.0 x 2.0 cm. Two days later a 0.1-c.c. intracutaneous injection of staphylococcus toxin, 1:100, caused an area of erythema and swell-

\* We believe this order of procedure to be important because we have observed in certain individuals, reactions resembling those described by Shwartzman,<sup>3</sup> apparently brought on by the action of the toxin; i.e., certain individuals, when injected with staphylococcus toxin and another antigen in different skin sites react to the second antigen non-specifically.

ing 8.0 x 6.0 cm. Both of these reactions were read after 48 hours. On September 27th, staphylococcus toxin, 1:100, in lens extract, 1:50, caused a reaction 9.0 x 7.0 cm. This mixture was diluted 1:10 and 0.1 c.c. was injected intracutaneously, twice a week until October 29th, when the left eye was no longer inflamed. At this time neither the treatment mixture nor the lens extract caused any cutaneous reaction. Treatment was then discontinued. May 2, 1935, the patient did not react to lens

photographs of cutaneous reaction and ocular condition). Two days later staphylococcus toxin, 0.1 c.c. in a dilution of 1:100, caused a reaction 4.5 x 4.0 cm. A treatment mixture consisting of staphylococcus toxin, 1:100, in lens extract, 1:50, was prepared and intracutaneous injections of 0.1 c.c. twice a week were begun. After the patient was discharged he returned to the out-patient department at irregular intervals so that he did not receive an orderly course of injections. However, on De-



Fig. 1 (Burky and Henton). Patient C. S. Condition of left eye on September 23d when endophthalmitis phaco-anaphylactica was suspected.



Fig. 2 (Burky and Henton). Cutaneous reaction to lens extract on September 23d.

extract. A capsulotomy of the left eye was done without any sequelae. On July 12th, an optical iridectomy was performed on the right eye. The patient was discharged July 25th, with a negative cutaneous reaction to lens extract and with the following refractive correction: O.D. +10.00 D. sph.  $\approx$  +0.75 D. cyl. ax 180°, resulting in vision of 8/200 (amblyopia exanopsia); O.S. +10.00 D. sph.  $\approx$  +0.75 D. cyl. ax 180°, with which vision was 20/40, add +3.00 D. sph. = J1.

**Case 2.** C. S., a white male, aged 52 years, was admitted to the Wilmer Ophthalmological Institute on June 25, 1934, with a diagnosis of immature cataracts, bilateral. Vision: O.D. = 1/100; O.S. = 2/200, could not be improved. On June 28th, an extracapsular extraction on the left eye was performed. Considerable lens substance was retained. Within a few days an iridocyclitis developed which continued until September 23d, when lens extract, 0.1 c.c. in a dilution of 1:100, caused a cutaneous reaction of 4.5 x 4.0 cm. (see

cember 5th he no longer reacted to the treatment mixture or lens extract alone and the eye which had been operated on was quiet. On March 11, 1935, he was again tested with lens extract and found to be nonreactive. An iridectomy was performed on the right eye at this time without any sequelae. He was readmitted on October 2d, at which time he was likewise nonreactive to lens extract. On October 5th, an intracapsular extraction was attempted on the right eye. This was not successful and an extracapsular extraction was performed. Considerable lens substance was retained. From this time the patient's clinical course was unsatisfactory. It was impossible to keep him in bed and he also developed a urinary retention which required repeated catheterization. Atropine conjunctivitis and dermatitis developed. This was cleared up by October 26th. In spite of these complications there was no intraocular inflammation suggestive of endophthalmitis phaco-anaphylactica. On November 16th, a lavage of the anterior cham-

ber for removal of retained lens substance was done. This was followed by a purulent postoperative infection with panophthalmitis and loss of the eye. Cutaneous reactions to lens extract remained negative.

**Comment.** These two cases show that the cutaneous reactions to lens extract can be changed from positive to negative by the intracutaneous injection of a mixture of staphylococcus toxin and lens extract. This change cannot be brought about by the injection of lens extract alone. One of us (E.L.B.) has attempted desensitization in 10 or more patients by the subcutaneous injection of lens extract alone. None of these patients lost cutaneous sensitivity.

It cannot be categorically stated that this change in the cutaneous reaction was accompanied by a loss of ocular sensitivity, for we have no way of definitely determining the sensitivity of the ocular tissues to a foreign protein. In case 1, however, the good end result in the eye followed the subsidence of the cutaneous sensitivity. The end result in case 2 was poor, but it is probable that the sensitivity played no part in the

final result, for there was no immediate nor delayed intraocular reaction to the retained lens substance, the right eye having been lost through postoperative infection.

The results obtained in two cases do not justify our coming to definite conclusions. The loss of cutaneous sensitivity was, however, definite in both patients and all of the evidence points to a loss of ocular sensitivity. Approximately two years have elapsed since this method of treatment was begun. In that time only two cases have been encountered in the Wilmer Institute in which desensitization seemed indicated. Because of this low incidence it would require too long a period to secure enough cases definitely to prove the value of this form of therapy. Therefore, this method is presented with the hope that it will be given a wider trial.

**Summary.** By the intracutaneous injection of a mixture of lens extract and staphylococcus toxin, a preëxisting cutaneous sensitivity to lens can be eliminated. It is probable, but has not been proved, that ocular sensitivity to lens is also eliminated or reduced.

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# AN ILLUMINATING DEVICE TO BE USED AS AN ATTACHMENT TO THE BINOCULAR CORNEAL MICROSCOPE FOR GONIOSCOPY AND GONIOPHOTOGRAPHY

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An illuminating device is demonstrated that can be attached to any standard corneal microscope, which, thus equipped, may be used for gonioscopy and goniophotography. With the aid of the contact glass for fundus examination, and the corneal microscope equipped with the illuminating device, observations of the fundus can be made with high magnifications. Demonstrated before the American Academy of Ophthalmology and Otolaryngology at Cincinnati, September 14-20, 1935.

The instrument (fig. 1) consists of a 3.5-v. 3.8-amp. straight filament lamp of special design, adjustably mounted

tical adjustment by a quick-acting screw (fig. 1-d) permits a rapid leveling of the entire accessory.

This device attaches directly to the mounting of the binocular corneal microscope by means of a clamp screw (fig. 1-e and fig. 2). Located between the objective mounts, it provides central illumination close to the object, with provision made on the mounting to avoid direct reflex into the objectives of the microscope. The axis of illumination in relation to the axis of the objectives may vary vertically between 3 and 18 degrees.

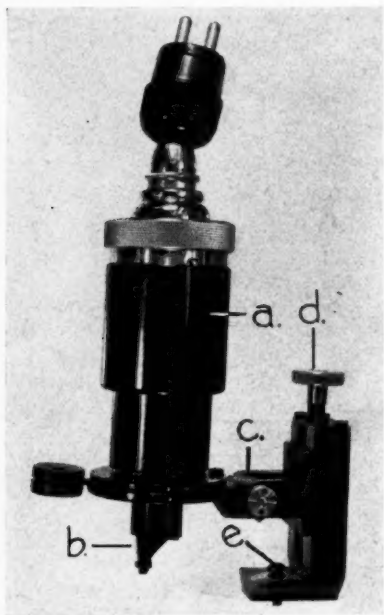


Fig. 1 (Castroviejo). Author's illuminating device.

in a vertical lamp housing (fig. 1-a). Below the lamp are mounted a totally reflecting prism of 87 degrees' deviation and a condenser of 2.5-cm. focal length (fig. 1-b). The vertical adjustment of the filament near the focal plane of the condenser permits the use of a collimated, diverging, or converging beam, as desired, of narrow cross-section and high intensity. The illuminating system, as a unit, is mounted on a tilting hinge for adjustment (fig. 1-c) at various angles to the axis of the microscope, to avoid reflexes. Behind the hinge joint, a ver-

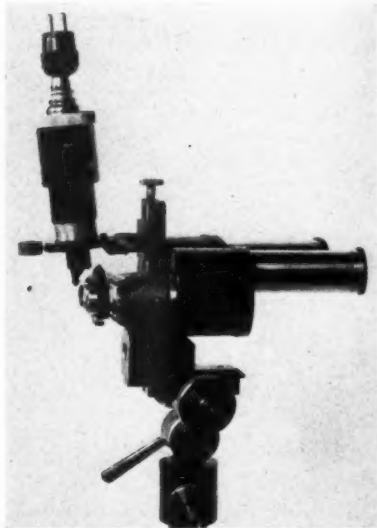


Fig. 2 (Castroviejo). Illuminating device mounted on the binocular corneal microscope.

## Gonioscopy and goniophotography in human eyes

The patient is placed in the recumbent position and the eye anesthetized

with several instillations of holocaine hydrochloride, 1-percent solution. The conjunctival sac is freely irrigated with normal saline solution to wash out mucus and other foreign substances which, interposed between the contact glass and the cornea, may disturb the observation. The Zeiss-Koepe contact glass with full hemisphere for iridic angle, also called "C" glass when made by Bausch and Lomb Optical Company of Rochester, New York, is placed in position with the margins of the eyelids surrounding the glass and lying in the groove around its border. The glass is thus held by the eyelids and pressed tightly against the eyeball. Normal saline is then injected to fill the space left between the concave surface of the contact glass and the cornea. For this maneuver, a small canula attached to a rubber bulb, similar to that which is used for the irrigation of the anterior chamber of the eye, may be employed. The external surface of the glass is then washed with distilled water and care-

coating of salt deposit which greatly disturbs the view.

The observation of the angle is made with the microscope, equipped with the illuminating device, as indicated in figure 3. Various magnifications can be obtained by using different objectives, but best results will be obtained with the objectives of low power, which, having more depth of focus, permit the simultaneous observation of different planes. The stereoscopic view of the angle of the anterior chamber obtained



Fig. 3 (Castroviejo). Showing how the examination of the angle of the anterior chamber is conducted.

fully dried with a piece of gauze. If the saline solution comes in contact with the external surface of the glass, the rapid evaporation of the fluid leaves a

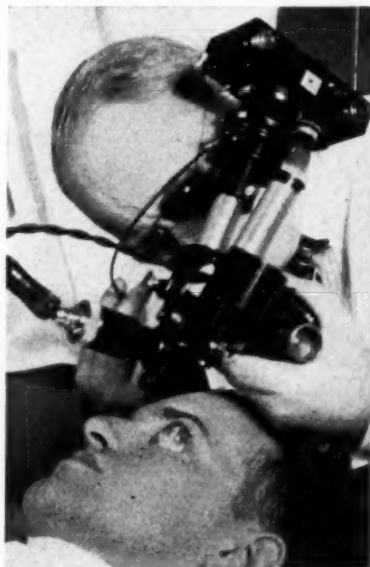


Fig. 4 (Castroviejo). Showing how the equipment for photography of the angle is assembled.

with the binocular microscope, used as described, provides greater ease in the interpretation of histological and pathological details which may be puzzling when monocular observations are employed. For demonstration purposes the binocular microscope may be used by two observers simultaneously, each one looking through a different ocular. In this fashion the instructor points out the interesting details to be observed by the second person and thus it becomes most useful for teaching.

If a photograph of the angle is desired, one of the oculars is replaced by a miniature camera (fig. 4) equipped with a lateral view finder. The observa-

tion of the angle is made through the lateral view finder. When the desired field of the angle has been brought into focus, the prism action which deviates the image towards the lateral view finder is automatically interrupted by making exposure with a special cable release. Photographs may be taken with exposure of one twentieth of a second (fig. 5).

For photographic purposes the microscope with the accessories should be

when the anterior segment of the eye is examined with the binocular microscope and the slitlamp. The patient is in a sitting position, his head kept steady in the head and chin rest, and the fundus is observed with the binocular microscope equipped with the illuminating device. It is convenient to have the microscope mounted on a heavy stand, equipped with a cross-slide adjustable movement, to facilitate focusing.

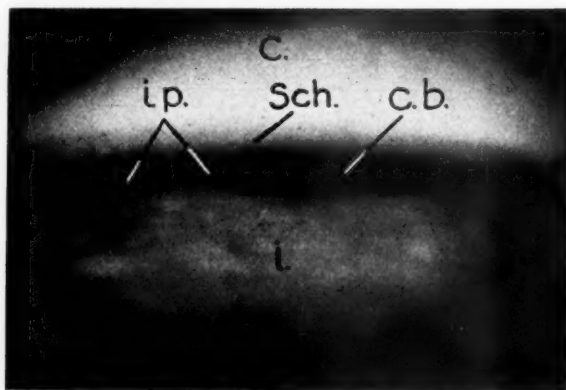


Fig. 5 (Castroviejo). Photograph of the angle of the anterior chamber of a normal eye: c., cornea; Sch., Schlemm's canal; c.b., ciliary body; i.p., Iris processes; i, Iris.

mounted upon a heavy compound base for the binocular microscope, which permits a free and fully controlled movement of the camera in every desired direction for adjustment and focusing without being subject to vibrations.

#### Examination of the fundus

For this purpose the most recent Zeiss model of contact glass for fundus examination is required. This contact glass has a flat anterior surface of 15 mm. diameter, the previous model having a 9 mm. flat surface. The new model makes it easier for the pupil to lie beneath the examining area of the glass, when it is placed in position. The pupil should be widely dilated, the contact glass placed in position and the space between the eye and the glass filled with normal saline solution. The observation is now made in the same way as

Very clear observations of the fundus can be made in this way with magnifications ranging from 15 to 60 diameters, depending on the objectives used. The author has been able to obtain photographs of the fundus, using the equipment described above, but for this it is necessary to have a maximum dilation of the pupil and a very coöperative patient. However, photography of the fundus with standard cameras and methods which do not necessitate the use of contact glasses is more practical.

I am indebted to Dr. M. Uribe Troncoso for his instruction in gonioscopy of both human beings and animals. It was he who first demonstrated to me the angle of the anterior chamber of animals, with the aid of the gonioscope and the Koeppel contact glass. The easy observation of the anterior-chamber angle of animals gave me the idea of utilizing animals to develop some

means of obtaining photographs of the angle. A technique was devised which permitted photography of the angle of both human beings and animals.\* However, it was complicated, necessitating the use of instruments with which

\*Castroviejo. Amer. Jour. Ophth., 1935, v. 18, June, p. 524.

ophthalmologists are not well acquainted, and therefore the method was impractical.

I wish to express my appreciation to Mr. Victor M. E. Koch, of Carl Zeiss, Inc.—New York Agents for Carl Zeiss, Jena—for his coöperation in making the instrument here presented.

## PARALYSIS OF DIVERGENCE OF FUNCTIONAL ORIGIN

### (A case report)

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A young married woman complained of the sudden onset of convergent strabismus and diplopia, which was found to be due to paralysis of divergence. Neurological examination was negative. The recent death of the patient's mother, the serious illness of her father which later terminated fatally, and the loss of employment of her husband created an intolerable mental conflict. Recovery occurred from the divergence paralysis soon after the husband found employment and the patient became resigned to the loss of her parents.

Mrs. W. D. B., white, aged twenty-six years, was examined by me for the first time on November 22, 1933. Her complaints were of blurred distant vision, strabismus, diplopia, and pain in each eye, greater in the right than in the left.

The past personal history disclosed the following facts: She had never had any serious illness. The usual childhood diseases were attended with no serious complications nor sequelae. Vision for distant objects was not so good as that of many of her associates, but she did not choose to wear spectacles and for that reason had been content with her reduced vision; she had no difficulty with near work and read a great deal. The patient had been married two-and-one-half years; there had been no pregnancies and no menstrual disturbances. Her mother had died two years previously, the death causing severe mental shock to the daughter. At about the time the patient was becoming reconciled to the absence of her mother, her husband lost his position. The mental hardships that accompany economic reverses harassed the patient. A few months after her husband had lost employment, her father had been taken ill with a serious cardiac ailment. This was about three weeks prior to the on-

set of the ocular and visual symptoms of the patient. Mrs. B. attempted to care for her father and this required her attention for many hours of the day and night.

The present ailment began about November 15, 1933. At first the patient experienced considerable aching in both eyeballs; soon afterward she observed that objects a few feet distant were seen double. Newsprint was blurred and the lines of print became mixed up unless she held the paper close to her face. She was unable to read for very long at a time on account of the early onset of pain in eyes and orbits. Her husband noticed that her eyes turned in.

Examination. No pathology was found other than that which will be described for the eyes. The blood Wassermann reaction was negative.

Central vision in the right eye was 6/60; in the left eye, 6/40.

Pupils: These were round and each was approximately 3.5 mm. in diameter. They responded normally directly and consensually to light and convergence stimuli.

The lids and ocular appendages were normal in appearance.

Ocular movements: There was concomitant convergent strabismus. When the patient was asked to look at an ob-



ject six meters distant, the deviation varied from twelve to twenty-five degrees. Fixation alternated between the two eyes, and there was difficulty in fixating with either eye unless the other was occluded. The field of rotation was normal for each eye when tested with the opposite eye occluded. Homonymous diplopia was present. The deviation of the eyes remained constant in the cardinal directions of the gaze so long as the distance of the object of fixation from the eye was unchanged; but the separation of the images increased as the object of fixation was carried away from the patient and decreased with its nearer approach. Separation of the images did not change when the test object was moved from the primary position into the different fields of gaze. Binocular single vision was present when the test object was held from 60 to 70 cm. from the patient's face. The convergence near point was six centimeters.

The ocular fundi were normal.

The refraction was determined under five-percent homatropine cycloplegia and was found to require: O.D.,  $-0.25$  D. sph.  $\approx -2.00$  D. cyl. ax.  $90^\circ$ ; O.S.,  $-0.25$  D. sph.  $\approx -2.25$  D. cyl. ax.  $100^\circ$ . With this correction vision equalled 6/6 in each eye. Diplopia was more troublesome while the patient wore this lens combination. At postcycloplegic examination, an additional half diopter of minus sphere was needed to give 6/6 vision.

On different examination dates the convergence near point varied from 5 to 12 cm. and binocular single vision could be obtained at distances ranging from 10 to 90 cm.

The patient was observed at intervals until February 24, 1934, when she was placed under atropine cycloplegia for one week. At the end of that time the refraction was found to require: O.D.,  $-2.00$  D. cyl. ax.  $90^\circ$ ; O.S.,  $-2.25$  D. cyl. ax.  $100^\circ$ . With this correction vision equalled 6/6 in each eye. The ocular deviation remained essentially the same as that on November 22, 1933.

Dr. Frank Hutchins examined the patient at this time and found no organic lesion of the nervous system. It was his

opinion that the functional disturbance was caused by emotional stress which was aggravated by the physical exhaustion incident to the responsibility of caring for her father. Lugol's solution was prescribed. Amytal was given to induce sleep. The patient was relieved of the care of her father and by March 10, 1934, felt better. There was a convergence of fifteen degrees for distance fixation in the primary position.

The patient was reexamined at intervals until June, 1934. During the period from March to June her father had died. The removal of the anxiety and uncertainty engendered by his illness appeared to have a beneficial effect upon the patient. During June, 1934, her eyes would deviate nasally whenever she became fatigued. Diplopia could be elicited when the eyes were rotated to the extreme left. At about this time the husband found employment in a distant city and the patient changed her place of residence. During the fall of 1934, she sent word that she had no trouble with double vision nor with the eyes' becoming crossed as long as she did not become fatigued.

A diagnosis was made of functional paralysis of divergence, which in this case may be ascribed to functional disturbances initiated by mental shock and anguish upon the death of the mother, intensified by anxiety over economic problems related to her husband's loss of employment, and to physical exhaustion incident to nursing her father during his last illness along with the mental perturbation arising from the fear and apprehension of his approaching death.

Paralysis of divergence is a rare anomaly of the conjugate ocular movements. It is to be differentiated from bilateral abducens paralysis and spasm of convergence. In the former there are to be found the classical symptoms of muscle paralysis. Spasm of convergence is also an unusual finding; the spasm is intermittent, is associated with efforts to look at near objects, and is usually accompanied by nystagmus. During the attacks the pupils contract.

During the past several years, a few

cases of paralysis of divergence have been recorded in ophthalmic literature. Chambers<sup>1</sup> reported a case of paralysis of divergence that accompanied encephalitis lethargica. Lebensohn<sup>2</sup> had two patients with this condition; in one the anomaly arose in association with chorea and in the other with tabes. Dunphy<sup>3</sup> reported the phenomenon in a patient with a diagnosis of multiple sclerosis. Howard<sup>4</sup> saw a patient who had metastases from carcinoma of the breast and in whom divergence paraly-

sis appeared abruptly. Roese<sup>5</sup> reported one case; the patient was riding on a train when the condition occurred. Stokes<sup>6</sup> reported five cases of his own and stated that up to 1934, fifty cases in all had been recorded in the literature. Shannon<sup>7</sup> reported divergence paralysis in a young man during an attack of "la grippe"; the patient recovered and the ocular disturbance disappeared. Bruce<sup>8</sup> recently published an excellent review of the subject.

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## NOTES, CASES, INSTRUMENTS

### SPONTANEOUS RUPTURE OF THE SCLERA (TUBERCULOUS)\*

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BROOKLYN, NEW YORK

Mrs. V. W., colored, 25 years old, was admitted to the eye service of the Kings County Hospital, on July 10, 1935. She complained of sore eyes and loss of vision. The present acute ocular condition dated back two weeks, but six months previously the patient had noticed a beginning diminution in vision for which she had sought treatment at a clinic.

The patient gave a history of having two children, ten and eight years old; no miscarriages; normal menstrual history with intermenstrual leucorrheal discharge. Three years ago she was operated on at the Long Island College Hospital for a "ruptured intestine."

Both eyes showed a slight puffiness of the lids and a moderate degree of photophobia. The conjunctiva had the milky coloring and tenacious mucous secretion of vernal catarrh. There was only mild circumcorneal injection; the cornea of each eye had numerous mutton-fat deposits on Descemet's membrane; the anterior chambers were deep; there were irregularly contracted pupils as a result of posterior synechiae; each iris was muddy and bound down to the lens capsule at the pupillary border by several caseous nodules. No view of deeper structures could be obtained. Finger tension was within normal limits. The patient counted fingers at one foot with each eye.

Under the use of atropine, the eyes felt better; the caseous nodules and mutton-fat precipitates became somewhat absorbed, and the latter assumed a faint bluish color; the left pupil dilated irregularly, especially at the temporal border, but the right pupil remained bound down in its original shape (fig. 1).

On the eighth day after admission the patient complained of rather severe

pain in the left eye and the feeling of a foreign body. Examination showed that there had occurred a sudden prolapse of the iris and ciliary body through a spontaneous rupture of the sclera near the limbus between the 2- and 5-o'clock position. There was a thin covering of episclera and conjunctiva over the bulging prolapse. The anterior chamber was not lost then nor at any future time. The tension, estimated with fingers, was increased though the eye appeared to be less congested. Atropine was discontinued and frequent instillations of eserine salicylate ordered in the hope of reducing the herniation, but it slowly increased in size to that shown in the drawing (fig. 2), and has remained so ever since. Aside, however, from the mechanical discomfort endured, the patient has had no complaints about the left eye; indeed, the widening of the pupil temporally due to the prolapse has so improved the vision (20/70), that this has become the better eye.

The laboratory reported, in the meantime, as to the blood chemistry and the differential blood count, both of which were normal; the conjunctival smears showed numerous lymphocytes but no eosinophiles; and the Wassermann test was four plus. The positive Wassermann in this case may have been due directly to the Vincent's infection of the gums rather than syphilis; however, antiluetic treatment was instituted and may have been beneficial in clearing up the gum infection. At the end of two months the blood test was negative. The Mantoux reaction (1:100,000 dilution) was strongly positive, but tuberculin injections were not given for fear of aggravating the chest condition.

X-ray films of the chest were very interesting. The July 18th report read: "Marked prominence of both hila, with infiltration from right hilum into upper lobe. The enlargement of the left hilum has a lobulated appearance suggestive of a glandular involvement. The findings are consistent with a hilar type of

\* Read before the Brooklyn Ophthalmological Society, October 17, 1935.

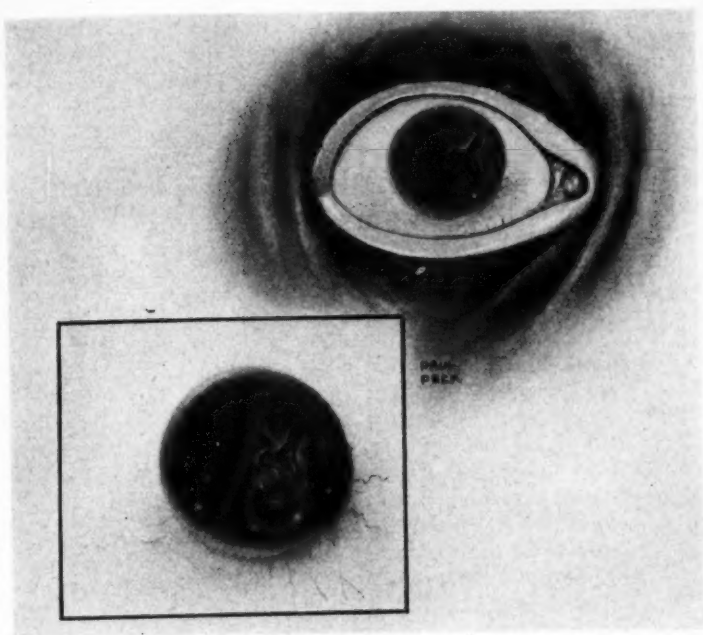


FIG. 1

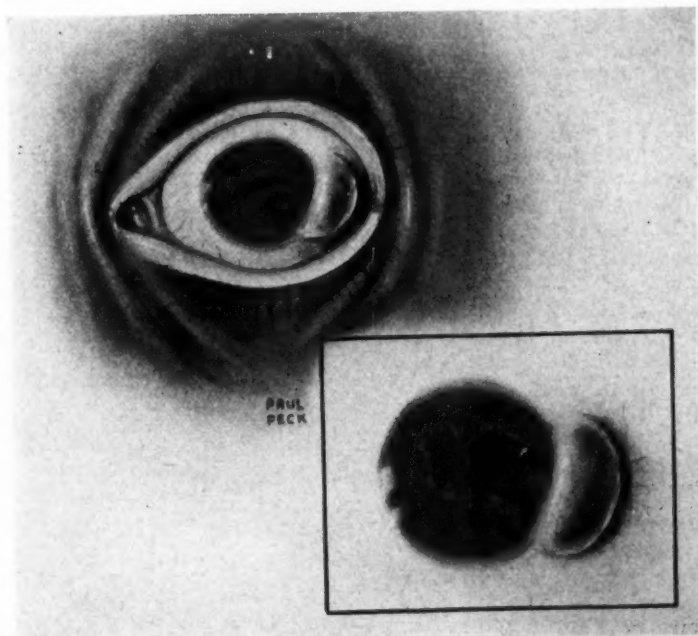


FIG. 2

Fig. 1 (Richman). Right eye. Shows condition present in both eyes at time of admission, leading to diagnosis of bilateral tuberculous iridocyclitis. This eye has remained unchanged; the left eye has changed as in figure 2.

Fig. 2 (Richman). Left eye. One week after admission, this prolapse of iris and ciliary body appeared through a spontaneous rupture of the sclera, evidently at the site of a caseous erosion. Condition still present.



tuberculosis, although not entirely characteristic." On July 25th the report was: "Bilateral mediastinal masses, as formerly described, are suggestive of lymphomatous type of new growth such as Hodgkins disease." On August 22nd: "Bilateral protrusion of both hila in the shape of spherical masses measuring from one to two inches in size, as associated with mediastinal tumor. Hodgkins disease must, therefore, be considered, although basal tuberculosis may be present." On October 10th: "Comparison with previous films reveals practically no change in the hilar infiltration on both sides, except for slight increase in density on the left side." The final opinion of the roentgenologist was that the patient had a juvenile type of hilar tuberculosis without any clinical signs. The sputum examination was repeatedly negative for tubercle bacilli.

In this connection, it is interesting to note the diagnosis of the patient's surgical condition made three years previously at the Long Island College Hospital, when an obstructing mass necessitated a resection of the jejunum from which the patient made an uneventful recovery. The laboratory reported the presence of giant cells in the microscopic section of the specimen, which established the diagnosis of "intestinal obstruction, tuberculous."

Though the facts in this case are complicated and unusual, certain findings warrant conclusions ascribing the spontaneous rupture of the sclera to a tuberculous lesion eroding through the limbus, the rupture, in turn, permitting herniation of the iris and ciliary body. These findings are: 1. The clinical diagnosis on admission of a bilateral tuberculous iridocyclitis; 2. The roentgenologist's diagnosis of a juvenile type of hilar tuberculosis; 3. The pathologist's diagnosis of a tuberculous intestinal involvement based on the finding of giant cells; 4. The fact that antisyphilitic treatment had no absorptive effect whatever on the masses present in the hila of the lungs, which would have been the case had the causative factor been a gumma.

No treatment for the tuberculosis

was given other than complete bed rest for three months and a high caloric diet rich in vitamins.

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### A MODIFIED CAPSULE FORCEPS FOR CATARACT EXTRACTION

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DENVER

Many capsule forceps now on the market are very delicate. Even with careful handling, they soon lose their adjustment. The present modification of the Verhoeff forceps was devised to obtain a more substantial instrument which would be suitable for grasping the anterior capsule of the lens in the coloboma of the iris near the equator.

Recent reports indicate that the intracapsular-cataract extraction by the method of Dr. F. H. Verhoeff of Boston, is consistently superior to other methods reported. In order to use the present forceps successfully it is necessary to change the Verhoeff operation slightly. Briefly, after the usual section and iridectomy, the Verhoeff method consists of grasping the lens, after pressure is applied at the lower limbus. The lens is straddled, with the anterior blade of the forceps on the anterior capsule and the posterior blade on the posterior capsule, and is then rotated from side to side and slowly extracted with the aid of pressure below.

The modified forceps is held like a pencil. The capsule is wrinkled by pressure on the lens through the coloboma of the iris, and is grasped as near the equator as possible. The lens is lifted toward the cornea and out of the wound by means of pressure below at the limbus with the blunt end of a squint hook. Slight to-and-fro motion may be used in the delivery of the lens, care being taken to keep the posterior capsule close to the scleral lip of the wound.

Many lenses after removal in capsule, were subjected to the following test. Equal grasps were taken on the anterior surface of the lens near the equator with the modified forceps and by the method of straddling the equator with the original forceps. Almost in-

variably the capsule ruptured with the latter procedure. Although the lines of force on the extracted lens are not the same as on the lens in situ, it was thought that the new method had some advantage.

A sufficient series of patients has not been operated on to make any statistical report of value, but to date the method appears to have as high a per-



Fig. 1 (C. E. Walker, Jr.). Capsule forceps for cataract extraction.

centage of successes as the published results of the original operation. It does have the advantage of being a simpler operation with forceps which remain in adjustment for a longer time.

The forceps is now made by V. Mueller and Company of Chicago.  
1114 Republic Building.

## AN UNUSUAL CASE OF BILATERAL RETINAL DETACHMENT

### Operation by the Safar method

DOHRMANN K. PISCHEL, M.D.  
SAN FRANCISCO

This case of bilateral traumatic detachment of the retina is briefly presented because of its very unusual history together with a successful operative result in a case of long-standing detachment.

The patient is a 46-year-old lumberman. On May 31, 1932, he was struck over the right eye by a knot of wood with sufficient force to knock him down. The vision gradually failed, and two months later an examination by an eye physician revealed the presence of a detachment of the retina involving at that time the outer lower quadrant. Subsequently the vision decreased still more, and the detachment increased, but the patient had nothing further done for the eye, which became practically blind.

On March 1, 1933, nearly a year later, he was struck in the left eye (the good eye) by the limb of a tree. He was painfully injured and was treated by an

ophthalmologist who reported a perforating injury of the left cornea with prolapse of the iris and an anterior chamber full of blood. After appropriate treatment he was discharged with vision of 15/20. This gradually decreased, however, so that by March, 1934, he was practically blind in that eye also.

Examination of May 25, 1934, showed the following: O.D., externally essentially negative; O.S., an adherent leucoma towards the 10:30-o'clock position with distorted pupil, and small opacity occupying the nasal superior part of lens.

There was a total detachment of the retina of the right eye, rising very sharply from the disc. Temporal and below, between the 7:30- and 10-o'clock position there was a long disinsertion of the ora serrata but no other holes were visible. In the left eye there also was a total detachment of the retina with a similar long disinsertion of the ora serrata, from the 2:30- to 5:30-o'clock position. Vision of the right eye was ability to count figures at 30 cm. and of the left eye finger counting at 35 cm. It was not possible to measure the fields.

On May 28, 1934, fourteen months after the injury, the left, or more recently injured eye was operated on. A Safar multiple-diathermy-puncture operation was performed: 37 pins inserted in a double row in a crescent enclosing the disinsertion. There was uneventful convalescence. The retina reattached completely; six weeks later vision was 15/70 and a normal field was found.

On September 20, 1934, the right eye was operated on, two years and four months after the accident to that eye. A Safar multiple-diathermy-puncture operation was performed: 48 pins inserted in a double row in a crescent enclosing the disinsertion. Again an uneventful convalescence followed. The retina reattached, and the field became normal, vision being 15/100 one month later.

Examination May 21, 1935, showed complete reattachment of both retinæ. Vision of the right eye (which had had a detachment for two-and-one-third years) with correction was 15/50, J. 1; of the left eye (which had had a detachment for one year and a traumatic cat-

aract due to a perforating injury) with correction was 15/100, J. 5. The patient was performing his usual work and driving a car.

### Summary

This case presents several unusual features: bilateral traumatic total detachment with almost symmetrically placed oral disinsertions (i.e., in the temporal inferior quadrant in each eye); complete healing of a detachment which had existed over two years and four months and with remarkable vision of 15/50; complete healing of a detachment in an eye with a perforating injury which had injured the iris and lens causing a traumatic cataract.

This should lead to a more optimistic outlook than has prevailed in dealing with cases of over a few months' duration and one should be led to try operations even in cases of very long standing.

Medico-Dental Building.

## EYE COMPLICATIONS FOLLOWING THE USE OF REDUCING AGENTS

WILBER F. SWETT, M.D.  
SAN FRANCISCO

In a relatively small series of cases presenting eye complications following the use of reducing agents the following four show a marked variation from the usual pathology reported in the literature and are exceedingly interesting for this fact.

**Case 1.** Mrs. G. L. B., aged 24 years, was first seen by me early in 1932, and her eyes were found to be perfectly normal. She had been pregnant in 1931, and after delivery of her child became quite stout. For this reason she was placed on a strenuous diet and took several bottles of thyro-pituitary compound (Coles Endocrine Compound #19). This compound contained half a grain of thyroid and an eighth of a grain of pituitary extract to a capsule. She took three or four capsules a day. On March 1, 1932, she noticed that the vision of the right eye was rapidly failing and of the left eye blurred. I examined her on March

5th, and found the vision in the right eye reduced to 20/100; that of the left eye, 20/20. Both optic discs showed temporal paleness, the right slightly more than the left. The visual fields disclosed a right homonymous hemianopsia, which was complete in the right eye, but only a moderate peripheral nasal contraction in the left eye.

The patient was immediately given a normal diet, and all medication was stopped. She was seen again on March 9th at which time the vision of the right eye had dropped to 20/200; that of the left eye had improved to 20/20. From March 9th to March 16th the vision and the hemianopsia recovered very rapidly and by April 16th the right eye had returned to normal. The patient has been seen regularly since that time and the condition has never recurred. This would definitely rule out pituitary disease. I believe that in this case the medication resulted in a temporary swelling of the pituitary body, which caused the right homonymous hemianopsia and which ceased as soon as the medication was terminated.

**Case 2.** Miss A. M. T., aged 45 years, consulted me on November 9, 1934, with the history of failing vision in both eyes for two months. Previous to this period, she claimed, her eyes had been examined and found normal. In October 1933, due to excess weight she was given dinitrophenol in increasing doses. She continued this medication at the rate of about four capsules a day until August, 1934, at which time, due to the fact that she had lost very little weight, she discontinued the use of the medication. At the time of my first examination her vision was reduced to 20/100 in both eyes, correctable to 20/40 part by a -3.0 D. sph. Her pupils were dilated and dense nuclear cataracts in both lenses were seen. The size and density of the nuclear opacity rapidly increased until February, 1935, at which time the cortex became involved and the lens became rapidly mature. The left lens was removed March 13, 1935, and the right lens on June 4, 1935. Both cataracts started clinically by a sclerosis of the lens nucleus which proceeded until the whole lens was in-



involved. This picture is just opposite to the classical one of developing cataract in patients who had received dinitrophenol, but the progress was much more rapid than in the usual cases of nuclear sclerosis. Due to the density and size of the nucleus, both eyes were operated on by the Hess method of combined extraction with excellent results.

**Case 3.** A young, married, Italian woman of 34 years had been rapidly gaining in weight and consulted her physician who placed her on a rigid diet combined with small doses of dinitrophenol (one capsule three times a day). The third or fourth day after starting treatment she broke out with what she described as a "measles rash" over her entire body but did not consult her physician. Thinking the condition was a mild case of measles she remained at home and continued her treatment. Three days later when the doctor was finally called she was found to have an extensive desquamative dermatitis which became rapidly so severe that not only the surface epithelium was shed but the mucous lining of the intestines, colon, vagina, mouth, and nasal cavities also sloughed. The conjunctivae of both eyes were so badly involved that the right eye developed almost complete symblepharon with ultimate loss of the right eye. The left eye, very fortunately, completely recovered, only a slight atrophy of the conjunctival tissues remaining. Due to the intestinal condition, the patient was not expected to live but finally made a complete recovery, except for the loss of the right eye, symblepharon of the right eye, and atresia of the vagina. Several plastic operations were attempted to correct the symblepharon of the right eye but due to the cicatricial changes in the cornea, which constantly ulcerated, the eye finally had to be enucleated.

**Case 4.** A school teacher, aged 41 years, owing to increased weight, took dinitrophenol from January, 1934, to April, 1934, inclusive. She first noticed dimness of vision in her right eye on March 20, 1935, and consulted me on April 28, 1935. During this relatively short period her vision dropped from

normal in both eyes to the ability to detect hand movements at two feet in the right eye and 20/40 part in the left. The swelling of the right lens progressed so rapidly that on June 20th, she was threatened with a secondary glaucoma. The right eye was operated upon the same day. Due to the fact that the lens was large, swollen, and soft in appearance I performed a linear extraction, which is my usual procedure for this type of cataract. The end result in operating by this method is so perfect that the eye appears as though it had never been touched.

The left eye followed the usual course of this type of cataract, showing the "cloth-of-gold" or "hammered-copper" appearance of the lens capsule with the opalescent general clouding of the whole lens substance. This lens is maturing so slowly that there is no danger of secondary glaucoma at the present time and will be operated on at the patient's convenience. The left eye in this individual may be taken as the usual type found in cataracts following the use of dinitrophenol.

The four different pictures presented by these cases show the dangers which may be encountered in using large doses of reducing agents indiscriminately and particularly in conjunction with drastically reduced diets.

### Summary

The first case was particularly interesting and showed that large doses of pituitary medication can cause an acute swelling of the hypophysis to such an extent as to result in an acute homonymous hemianopsia. The second case demonstrates that following the use of dinitrophenol the lens change may originate in the nucleus instead of in the capsule. The third case demonstrates an extreme toxic reaction, evidently in a susceptible individual, with disastrous results. The fourth case, which is more or less typical of the cases so far reported in the literature following the use of dinitrophenol, demonstrates the speed with which a secondary glaucoma may develop.

490 Post Street.



# SOCIETY PROCEEDINGS

Edited by DR. H. ROMMEL HILDRETH

## COLORADO OPHTHALMOLOGICAL SOCIETY

October 19, 1935

Dr. G. H. Stine, presiding

### Cataracts following the use of dinitrophenol

Dr. V. H. Brobeck presented the case of M. S., aged 24 years, whose family history was irrelevant. She had been working as a telephone operator for seven years and was not exposed to any particular industrial hazards.

In February, 1934, she was given dinitrophenol for obesity. The dosage consisted of three milligrams per kilo of body weight daily. Prior to the ingestion of the dinitrophenol she had had a few injections of thyroactin for weight reduction, but this was discontinued in favor of the dinitrophenol. After taking the drug for about twelve weeks and losing approximately three pounds a week, she began to complain of periods of excessive weakness with perspiration. She could not tolerate bed covers over her in extremely cold weather, had severe backache with dyspnea, especially at night, and complained that her skin felt very dry and that she had paresthesias of the extremities. She discontinued the drug after losing about thirty-five pounds. In April, 1935, one year later, having some capsules left, she took another course of them over a period of two weeks.

The patient first consulted Dr. Brobeck on September 28, 1935, complaining of rapid loss of vision dating back about three weeks. Her physical examination was essentially negative with the exception of the ocular condition.

The patient was given pilocarpine three times daily for the slight increase in pressure to tide her over the intumescent stage of the cataract. It would have been obviously difficult to operate on the patient at the time of presentation because of the shallow anterior chambers.

**Discussion.** Dr. J. M. Shields said he had had a similar case in which cataracts developed about a year after the ingestion of dinitrophenol. Linear extraction was successfully performed.

Dr. W. H. Crisp recommended a preliminary capsulotomy after the method of Homer Smith a few hours prior to an extracapsular extraction.

Dr. C. E. Walker, Jr., expressed the opinion that an intracapsular operation should be performed in the near future. He advised the Verhoeff method which was safe and yielded a high percentage of good results.

Dr. Melville Black said that one might use in this case a Ziegler dissection followed by a linear extraction if necessary, or an intracapsular extraction.

Dr. V. H. Brobeck said that Dr. Safar used intracapsular extraction in young people.

### Anterior choroiditis, probably tuberculous

Dr. George H. Stine presented the case of Mr. R. H., aged 31 years, who was first seen on May 28, 1935, complaining of sudden clouding of the vision in the left eye, two weeks before. There was no pain nor redness of the eye. The patient had had an attack of choroiditis in the same eye three years before, which was considered tuberculous. The treatment at that time consisted of subconjunctival injections and iodine internally, by another oculist; it was followed by activation of pulmonary tuberculosis and sloughing of the cavity. The pulmonary and intestinal tuberculosis was now in the quiescent stage. The vision of the right eye had been very poor for the past twenty years following macular choroiditis. The vision of the right eye was 0.08, of the left, 0.2.

The right eye showed a large dense vitreous strand extending backward. In the macula was a dense, white, depressed, choroiditic spot with faint,

reddish stripes in the center, surrounded by a grayish pigmented area, the entire mass being about  $1\frac{1}{2}$  disc diameter in size. There were many tiny, hard, white, pin-point dots around this area. This was diagnosed as a healed choroidal tubercle.

The left eye was externally normal except for a few cells on the posterior corneal surface and in the aqueous. There was a dense cloud in the vitreous composed of fine grayish-brown dust. In the next few days when the vitreous became clearer, a diffuse, white, not definitely elevated opacity, one disc diameter in size was seen two disc diameters above the disc. There was a healed, atrophic, choroiditic patch in the upper temporal fundus. The entire retina had a hard, glistening sheen which still persisted. There had been perivascular sheathing along the retinal veins in the nasal periphery, but this had now disappeared.

There was a positive local reaction to an intradermal test of .01 mgm. O. T., but no focal reaction. An X-ray film of the sinuses showed cloudy left ethmoids and a large polyp in the right antrum. The teeth were found to be negative, as was the blood Wassermann. Sinus surgery was considered, but it was resolved to try tuberculin therapy and mild X-ray radiation of the eye first. A few K.P. showing mutton-fat characteristics appeared two days after the positive O. T. reaction. Mild X-ray treatment was started on the tenth day of service with marked clearing of the vitreous and improvement in the vision to 0.5 two days later. Only two injections of B.E. with the largest dose  $1/20,000$  mgm. were given in order to control the results of the X-ray therapy more definitely. The usual local treatment of the eye with atropine, dionin, and heat was instituted.

The eye was quiet by July 22, 1935 (eight weeks). Atropine was stopped the middle of August, and the vision was 1.2 plus. A few small, nodular, vitreous opacities were still present. Some shrinkage of the vitreous was shown by the slitlamp and a plano contact glass. There had been no recur-

rence of the trouble at the time of presentation. The patient was taking sun baths with a general physical improvement.

**Discussion.** Dr. W. H. Crisp said that X-ray therapy should be thought of in any case of slow healing. Cases of sluggish keratitis sometimes responded to the X ray.

Dr. Hugo Lucic said that neosalvarsan might be of benefit in some cases in which there was no response from tuberculin and the Wassermann was negative.

Dr. J. M. Shields questioned if every case of cataract following the use of the X ray was due solely to that cause. He cited two cases of malignant acne in patients aged 35 years and 50 years, in which cataract formation followed X-ray treatment, and another case of acne, in which cataract developed although the X ray had not been used.

#### **Acute glaucoma secondary to hypermature Morgagnian cataract**

Dr. G. H. Stine presented the case of Mr. J. C. M., aged 70 years, who was first seen on July 29, 1935, complaining of redness and dull pain in the right eye for the past five days. Ten years ago he had had a cataract extraction from the left eye, and at that time an immature cataract of the right eye was diagnosed.

A general physical examination revealed a chronic pyelonephritis; nephrectomy was considered but not deemed advisable. There were infected teeth.

When the patient was first seen the ocular findings were typical of an acute glaucoma, but the anterior chamber was deep. There were no K.P. There was a milky-white, Morgagnian cataract with a yellow nucleus decentered downward. The tension, 76 mm. Hg (Schiotz), was reduced to 28 mm. in twenty-four hours by the use of eserine and paracentesis, and was held there for the first four days until a dense posterior synechia of the upper pupillary margin developed. This was easily ruptured by the use of scopolamine, cocaine, and two-percent supracrenin bitartrate, but the tension gradually

rose. Daily paracenteses gave only temporary relief. On August 5th, five infected teeth were removed.

Intracapsular cataract extraction with a narrow iridectomy was performed on August 8, 1935, without difficulty. The postoperative course was completely uneventful, with prompt recovery. The patient now used pilocarpine one percent twice daily. After the cataract extraction the tension had never been found to be above 30 mm. Hg. Vision with correction is 1.0, and there are no definite glaucomatous disc changes.

A hernia of the vitreous with a clearly visible hyaloid membrane was seen postoperatively. On August 28th the hernia had lessened and there was a small vertically oval hole in the hyaloid membrane through which a few strands of vitreous structure protruded into the anterior chamber.

**Discussion.** Dr. J. M. Shields questioned the accuracy of tonometric readings after a cataract section of the cornea.

Dr. W. H. Crisp said that a tension of 30 on the new Schiötz is a high normal, and that one should question the absence of glaucoma if tonometric readings are no lower than this.

Dr. C. E. Walker, Jr., cited three cases similar to this, one in which the tension was controlled by preliminary iridectomy. Cataract extraction was accomplished later.

#### **Traumatic paralysis of the left superior oblique following the removal of an anterior ethmoid mucocoele**

Dr. G. H. Stine presented the case of R. P., aged 12 years, who was first seen on January 11, 1934. At that time there was some swelling in the upper inner angle of the left orbit with proptosis and variable diplopia. The patient was seen again on August 1, 1935, following the removal of a mucocoele about a year previously. His complaint at this visit was double vision with shoulder tipping, general nervousness, and irritability since the operation.

The patient was found to have twenty-two centrads of left hyperphor-

ia and four centrads of exophoria, increasing on looking downward, down and to the right, and to the right. Diplopia fields showed a paralysis of the left superior oblique, and probably some secondary spasm of the right inferior rectus. The refraction was tested and subjective diplopia corrected by prisms for the average primary position. The patient is now much more comfortable, and there is an improvement in the objective findings. An advancement of the left superior oblique after the method of Wheeler might be done at a later date.

**Discussion.** Dr. Melville Black said that if the surgeon made his incision in the brow and followed the periosteum, taking care to avoid the trochlea, paralysis of the superior oblique should not occur.

Dr. R. W. Danielson said that in many cases of frontal and ethmoidal mucocoele the surgeon could not avoid damaging the trochlea.

Dr. E. B. Swerdfefer said that the mucocoele might involve the muscle directly.

Dr. G. H. Stine said that the patient is now wearing the correction for ametropia combined with four centrads prism, base out, over the right eye and eight centrads, base down, over the left eye with perfect comfort. There was single vision with this correction, but the red glass before one eye caused diplopia which varied between four and seventeen centrads left hyperphoria. There was slight extorsion.

#### **Syphilitic ophthalmoplegia of the left eye**

Dr. E. B. Swerdfefer reported the case of F. C., a 30-year-old white man who entered the hospital on September 29, 1935, complaining of headache and left nasal discharge of nine months' duration. He had had pain in the left face and jaws which removal of all the teeth had failed to relieve. Three months before entry a blood Wassermann was reported positive at a C.C.C. Camp and he was given neoarsphenamine and bismuth for two months. He gave a history of chancre in 1915, which

was treated by cauterization. Four days after entry he developed ptosis and some failure of vision in the left eye.

Examination revealed an ill and emaciated man showing complete ptosis and complete ophthalmoplegia of the left eye. The left pupil was oval and slightly larger than the right, but both reacted to light. Ophthalmoscopic examination was checked by Dr. W. A. Ohmart and no pathology of the disc or fundus was found. There were no visual-field abnormalities in either eye. The frontal sinuses and left antrum transilluminated poorly and an X-ray examination showed a chronic infection in these sinuses. The knee jerks were not elicited. The Wassermann report on the spinal fluid was four plus.

The patient was given potassium iodide and bismuth but continued to go down hill. He continued to complain of pain in the left face, and was troubled by some thickness of his speech. About two weeks after admission he began coughing and raising considerable sputum. An X-ray film showed old tuberculosis at the apices, and a diffuse opacity of the right-lower-lung field was interpreted as either syphilis, a tumor, or tuberculous pneumonia. An X-ray film of the skull showed no evidence of metastatic malignancy, but did show an osteoporosis which may have been syphilitic. He went downhill rapidly, lost much weight, and became completely blind in the left eye. He died on November 15, 1935, and as relatives could not be consulted, no autopsy was obtained.

George H. Stine,  
Recorder.

## COLLEGE OF PHYSICIANS OF PHILADELPHIA

### Section on Ophthalmology

December 19, 1935

Dr. J. Milton Griscom, chairman

#### Some remarks concerning a pituitary adenoma of long duration

Dr. George E. deSchweinitz and Dr.  
A. G. Fewell presented the case of

Mr. W. H. D., aged 55 years, who complained of progressive loss of vision for about six months. The vision in the right eye at the time of examination, October 9, 1935, was 6/30 and in the left eye 6/9. For years he had suffered from headaches. Both discs showed simple optic atrophy of the type which suggests pituitary dysfunction. The visual field for form was somewhat concentrically contracted in both eyes. There was a large centro-caecal scotoma for red in the right eye. In the left eye the lower nasal field was entirely absent. This blind area was connected with a very much enlarged blind spot. There was a bi-temporal hemianopsia for red. X-ray films showed a lesion which largely destroyed the pituitary fossa. The dorsum sella and posterior clinoids had disappeared. The right anterior clinoid was intact, whereas the left seemed elevated. X-ray treatments were tried for a time but this upset the patient, inducing violent nausea, and had to be discontinued. Dr. Frazier at the University Hospital operated and found a large adenoma of the pituitary extending into the posterior fossa. This was removed. It was thought that the tumor must have been present for at least seven or eight years. The patient did well for a time following operation but unfortunately developed pneumonia and died.

**Discussion.** Dr. Walter I. Lillie described a unique experience related to him by Dr. A. W. Adson. During the removal of the intrasellar portion of a pituitary tumor, his patient spontaneously remarked that she was experiencing the deep-seated centrally located headache which was the characteristic pain before operation. This type of headache is probably due to intrasellar pressure on the dura.

#### Exhibition of a case showing sequelae of interstitial keratitis with retinal exudate and massive hemorrhage

Dr. William Zentmayer presented the case of a girl, 11 years of age, with a plus-four Wassermann reaction. In the right eye there was an acute inter-



stitial keratitis with vision reduced to light perception. Detailed study of the fundus was not possible, but there appeared to be a large hemorrhage between the disc and the macula.

Two months later the vision in the left eye suddenly fell to 6/60. There was no evidence of keratitis. A circumscribed exudate was observed above the macula with a large hemorrhage at the lower border involving the fovea.

At the present time in the right fundus there is a vertical linear scar averaging about three vessel diameters in width and about three disc diameters in length, situated about one-and-one-half disc diameters from the temporal border of the disc. The central portion is white, and the borders on either side are densely pigmented. The upper portion flares somewhat and is covered by some overlying proliferative tissue. At the equator, paralleling the branch of the inferior temporal artery, there is a ribbonlike band paler than the surrounding fundus, probably a sclerosing choroidal vessel.

In the left eye, just above the fovea, is a perfectly round greenish-white atrophic area, one disc diameter across, with a rather dense pigmented border. Fine retinal vessels are made out on its surface. There is some proliferation over the lower portion of the lesion.

Corrected vision is 6/12 part in the right eye and 6/60 in the left eye.

#### **Lupus erythematosus of the eyelids and conjunctiva**

Dr. Perce DeLong and Dr. Joseph W. Klauder presented a 27-year-old white woman who had had the condition about one year. There were discoid patches of lupus erythematosus on the forehead, nose, and each side of the face, and both lids of both eyes were involved. These areas were atrophic, slightly red, and at places covered with fine adherent scales. The entire margins of the lids of both eyes were involved; the cilia were absent, the surfaces very dry and irregular. The conjunctiva of the lower lid of the right eye was involved with lupus erythematosus. The conjunctiva was elevated, smooth, and glistening, with

a velvetlike edema. The color was dark red with a purplish hue. On the posterior aspect of the right buccal mucosa was a sharply margined patch. The periphery was slightly elevated and violaceous; fine vessels ran over the periphery onto the normal mucosa. There was complaint of a burning sensation of both eyes with mucoid discharge.

During the past six months bismuth intramuscularly has been administered. The improvement following this therapy has been about fifty percent.

#### **Argyria of the conjunctiva**

Dr. Perce DeLong and Dr. Joseph V. Klauder presented a white woman, aged 39 years, who at intervals for four or five years had used argyrol in the eye in treatment of corneal ulcer as part of an acne rosacea. She also instilled argyrol into the nose whenever she had a cold. The mouth, tongue, gums, and skin showed no discoloration. The conjunctivae of both eyes were slate colored, appearing as though ink had been dropped into the sac.

A. G. Fewell,  
Clerk.

### **WASHINGTON, D.C., OPHTHALMOLOGICAL SOCIETY**

January 6, 1936

Dr. James N. Greear, Jr., president  
**Sight-saving classes in the public schools of the District of Columbia**

Dr. Frank D. Costenbader said that it had been estimated that one child in every 500 to 1,000 should be in a sight-saving class in order not to have to compete with those of normal visual acuity. There are approximately only 45 children being cared for in these classes in the District and according to the statistics at least 90 should be having the benefit of this type of education. This means that these youngsters have been overlooked and that the duty of the ophthalmologist therefore is to consider more carefully such cases when they are brought to his attention. The types of visual defectives that belong in these classes are those with corneal scarring or retinal damage that has re-

duced the vision to less than 20/70. The methods employed in teaching these children are interesting: Large clear type is used; yellow crayon is furnished for the blackboards; there is a special lighting system and the children are taught the touch system on the typewriter from the second grade up.

#### The screen test and its applications

Dr. James Watson White presented a paper on this subject which has been published in this Journal (August, 1936).

**Discussion.** Dr. William Thornwall Davis said that it is obvious that a careful study of strabismus cases must be made before surgery is performed and that Dr. White's method of studying cases in all fields had revealed facts of tremendous value in these difficult cases.

#### Esotropia and right hyperphoria

Dr. Frank D. Costenbader presented M. R., aged seven years, who had esotropia and right hyperphoria. The refraction measured O.D. +3.50 D. sph.  $\approx$  +1.75 D. cyl. ax. 90° and O.S. +2.00 D. sph.  $\approx$  +2.25 D. cyl. ax. 90°. With this correction vision was 20/50 in each eye. Orthoptic training had been attempted, showing rapid alternation at first, but very shortly a fair third-degree fusion developed. There was an early tendency to false projection which was later overcome. Four months later the following peculiar measurements were obtained. When looking straight up there was an exotropia of 12 diopters and right hyperphoria of 8 to 10 diopters. In the primary position for near there was an esotropia of 4 diopters and right hyperphoria of 8 to 10 diopters. Looking straight down he had esotropia of 12 diopters and right hyperphoria of 8 diopters. A diagnosis of paresis of the left superior rectus was made and a marked accentuation of the normal tendency to diverge when looking up and to converge when looking down.

The second case presented was that of A. D., a five-year-old girl who had had an alternating convergent strabismus with spasms of both inferior ob-

liques. Under atropine cycloplegia she accepted +2.75 D. spheres with which vision was 20/20 in each eye. A fusion test revealed no simultaneous macular perception although the patient cooperated well. Measurement for near showed esotropia of about 80 diopters without glasses and 40 diopters with glasses. Six weeks later a four-millimeter recession of both medial recti was performed. Measurements shortly after operation showed an esotropia of 10 diopters for distance and 15 diopters for near, with glasses; 18 diopters for distance and 20 diopters for near without glasses. A double hyperphoria was found at this time. Second-degree fusion could now be elicited and intensive fusion training was begun. Six months later she had a fair third-degree fusion with some amplitude. Esotropia without glasses varied from 10 to 15 diopters and a double hyperphoria more marked on the left side was found. Measurement of the deviation in the six cardinal fields revealed a double inferior-rectus paresis.

#### Retinoblastoma

Dr. E. Leonard Goodman presented H. P., a white girl, aged four years, first seen May 12, 1934, with a retinoblastoma in the right eye. Enucleation of the right eye was performed on June 12, 1934, one centimeter of normal optic nerve being removed with the globe. Examination of the left eye while the patient was under anesthesia was negative for a similar growth. Microscopic examination of sections of the right eye confirmed the diagnosis of retinoblastoma. On November 14, 1934, a few globular grayish-white opacities, similar to those found in the right eye, were seen suspended by thin pedicles from the roof of the left eye. On extreme elevation of the globe a moderately large grayish mass was noted above and far forward in the left eye. A series of eleven daily X-ray treatments was given to the anterior aspect of this eye and a like amount to the lateral aspect. Radiation was fairly well tolerated although there was loss of the lashes and considerable erythema of the skin. Shortly after the last X-ray treatment

the growths suspended in the vitreous were observed to disintegrate and the parent growth became more difficult to see. Fourteen months following the institution of the X-ray therapy the vitreous was clear and there had been decided retraction of the grayish mass in the roof of the globe. The lashes had grown in again quite well and only a slight cutaneous erythema remained about the eye. The crystalline lens has continued to be entirely clear and there is no photophobia.

#### Retinal detachment

Dr. Ernest Sheppard presented a case of retinal detachment in the lower half of the left eye in a man, aged 33 years, with congenital nystagmus. On the advice of Professor Lindner of Vienna, intraocular operation was deferred until myomectomy of the median and lateral recti had been done. Reattachment resulted following this procedure, and has lasted six months. A week following the time this case was presented before the Society the upper temporal quadrant detached. The case was presented to show the value of immobilization as advised by Professor Lindner.

Ernest Sheppard,  
Secretary.

#### NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

January 21, 1936

Dr. James J. Regan, presiding

#### Interpretation of the different forms of tuberculosis of the uveal tract

Dr. Francis Heed Adler said that statistics from different clinics vary considerably in the number of cases of inflammation of the uveal tract due to tuberculosis. This is due, in part, to the fact that there is no one characteristic picture of tuberculous uveitis. Illustrations from various standard textbooks often show great dissimilarity.

Experimental tuberculosis in animals varies in its clinical picture and course, due to a number of factors which have been well described in the literature. One of the most important of these is the allergic state of the animal to the protein of the tubercle bacillus. This allergic state may produce a diffuse, highly exudative lesion which has little in common with the characteristics of tuberculosis as usually seen, and which so masks the condition that the possibility of tuberculosis is not considered.

Virgil G. Casten,  
Recorder.

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## CORNEAL TRANSPLANTATION

Few fields of modern development possess more fascination for the popular mind and for the mind of the ophthalmologist than that of corneal transplantation, the attempt to replace opaque cornea with transparent cornea from another eye. The recent work of such men as Thomas, in England, and Castroviejo, in the United States, represents the relatively successful culmination of many earlier and less successful endeavors.

One of Nature's most regrettable imperfections is the failure to replace a highly differentiated structure with tissue of the same highly specialized kind after the original tissue has been destroyed. In the process of repair anywhere in the body the original structure is replaced by scar tissue, a fibrous structure of useful purpose but of primitive type. In the cornea the result is loss of that transparency which is

indispensable for the function of vision.

The likelihood that corneal transplantation will be practised by any very large number of ophthalmic surgeons is precluded on account of the many difficulties involved. Among these must be reckoned not merely the problem of finding a suitable donor but also the details of preliminary study, the many hazards involved in the patient's original injury or ocular ailment, and the niceties of operative and postoperative technique.

Rather more than a century ago Dieffenbach commented upon the few attempts at corneal transplantation that had then been made by saying that the graft would either fail to unite or would become opaque. Although in 1886, after twelve years' work, Hoppel had claimed partial success with a method in which Descemet's membrane was left in place, Magitot stated in 1912 that one hundred years of effort had produced about



half a dozen successes; and in 1924 Parson's Textbook on Diseases of the Eye dismissed the matter in the following terms: "Keratoplasty, the excision of a disc of scarred cornea and its replacement by a disc of clear cornea from a rabbit's or human eye is practically never successful. The new tissue rapidly becomes opaque."

Hippel, and later Elschmig of Prague and Filatov of Moscow, used a mechanical trephine. Elschmig published in 1930 the result of thirty years' work, showing thirty-five clear grafts out of 176 cases. Twenty-three or more of his grafts failed even to unite.

The work of J. W. Tudor Thomas (several papers, but especially Transactions of the Ophthalmological Society of the United Kingdom, volume 55, page 114 and page 373) and of Ramon Castroviejo (see especially Archivos de Oftalmologia Hispano-Americanos, volume 35, page 404), while including rather small series of cases, seems to represent genuine advances in technique and a more hopeful outlook. Thomas even goes so far as to declare that in suitable cases there is a seventy-five percent chance of valuable improvement in vision. The eye most suitable for such an operation is naturally one which is normal except as to the presence of corneal opacity. Vascularity of the cornea does not seem to be a contraindication.

In the presence of an anterior synechia the graft always becomes opaque. Success is more probable if the transplant is surrounded by corneal areas which are not greatly affected by the cicatricial process. The favorable chances are reduced by the presence of very dense leucoma, by aphakia, by operative loss of vitreous, and by ocular hypertension. But Castroviejo remarks that, since in such cases vision is almost always limited to light perception and projection or to mere light perception, corneal transplantation should be performed because it is the only means of improving vision.

Complicating conditions are as far as possible to be eliminated before transplantation is undertaken. Thus, free iridectomy should be performed for an-

terior synechia, or a tendency to glaucoma should be remedied surgically. Attention to these matters after transplantation will usually fail to avoid an opaque graft.

As to the actual technique of operation, Thomas and Castroviejo differ. Both agree that the graft is not to be sutured to the surrounding cornea, and both insist on the importance of a shelving edge for excision and graft. But Castroviejo cuts a square graft which is first outlined with parallel knife blades and is completed with keratome and scissors, whereas Thomas makes a circular graft with a hand trephine followed by scissors. Castroviejo secures his graft in position by bringing together over the graft upper and lower conjunctival flaps; while Thomas retains the graft by means of sutures carried through the surrounding cornea and knotted across the graft in a sort of double Maltese cross. Both first dress the eye after six days, and both keep the patient in bed several weeks after operation.

Castroviejo's detailed account of his cases abounds in valuable hints as to causes of failure and requirements for success. His best case gave vision of twenty thirtieths in an eye that had previously been able to recognize only hand movements a few centimeters before the eye. The case was one of old trachomatous pannus in a patient of fifty-eight years. The second eye of the same patient gave relative failure because an anterior synechia had not been excised before the transplantation was undertaken, so that hypertension developed. The importance of a complete history of the patient's previous condition is illustrated by a patient who had a postoperative tonsillitis and gained no improvement in vision.

Various sources for obtaining the graft have been tried. Filatov especially has experimented as to the possibility of fairly prolonged preservation of cornea taken from the cadaver, in Ringer's or other solution at a temperature slightly above freezing point. Most grafts have been obtained from eyes enucleated for conditions such as intraocular tumor or painful glaucoma. But

the age of the donor and the condition of his ocular tissues have a material influence on the result of transplantation. For this reason Castroviejo has recently resorted to the use of eyes of fetuses beyond the sixth month of development. The number of enucleations of eyes whose cornea is in satisfactory condition is distinctly limited. Moreover, it seems reasonable to suppose that the younger the tissue the greater its vitality.

From the scientific viewpoint, Thomas had the singular good fortune of being able to study histologically the corneas of two eyes in which he had performed transplantation with marked success, in one patient six months and in the other three weeks before death from influenza and incurable carcinoma, respectively. The vision of the former had improved to six sixtieths (from counting fingers at fifteen inches). The latter patient (from counting fingers at six inches) had obtained a perfectly clear graft and vision which he described as perfect. In each eye there was a very slight transitional zone of operative scar tissue between the parenchyma of the graft and the surrounding cornea. The eye of the six-months' case showed a small opacity in the lower part of the graft, and this appeared to be due to the presence of new tissue beneath the graft's Descemet's membrane. The stroma of the graft was free from invasion by blood vessels.

W. H. Crisp.

### OPTIMUM LIGHT

In our tests of vision we deal mostly with thresholds. With a Snellen test-card we seek the very lowest line the patient can see. With the broken ring, or the open square, we try for the greatest distance at which we can tell which way the opening is turned. In charting the field of vision, whether it is a 2 mm. or a 10 mm. square, we place the test object outside the field, and mark the point at which it becomes just visible. In laboratory testing for light perception, we start with complete darkness and note when the illuminated field becomes just visible. With color fields we seek the limit at which the color is first

correctly recognized. There are reasons for dealing with limits in these tests.

But when we seek the conditions most favorable to health, or recovery from disease, the problem is different. To utilize the sense of touch, to feel things, we do not want the hardest pressure that can be borne on the nerves nor the lightest touch that can be just perceived. We do not enjoy the sense of smell with heaviest odors, nor the perfume that is just perceptible. For music we do not want the loudest noise that can be borne nor the tone that can only be recognized by the closest attention. The solar spectrum, at either end, fades gradually into darkness, and the extreme limit is fixed for the infrared, or the ultraviolet, with great difficulty. Near the center of the spectrum the light is one hundred times brighter than that near the end. In choosing light to work by we must seek not the possible limits, the thresholds, but the optimum, the light which makes vision most easy, clear, and comfortable.

In choosing the optimum of light by which to work we must bear in mind the enormous range of light adaptation that is possible for human vision. After complete dark adaptation it is possible to notice the illumination of only a fraction of a foot-candle. But at noon of a bright day we may use the illumination of 10,000 foot-candles with comfort and visual efficiency for the perception of objects rendered small by distance such as mountain tops observed from the sea, animals moving on the desert, or distant smoke. We can do some useful things with dark-adapted eyes, but we can make out fine details, or see them most quickly, or easily, under good daylight illumination. It is easy to be misled into thinking that we can see just as well, or just as easily, in the light we have been accustomed to though it may not be a really good light for our seeing. The automatic adaptation of the eye fits it to make the best of what light we have, and we put up with it, without realizing that we could see much better with more light, and that the poor light is making the work far harder for the eye. A boy, who wanted to finish reading a book, kept on reading in the fading twilight.

He finished the book; but he stayed in a dark room for two weeks after that, and it was a month before he could read another book.

The eye physician who understands something of the adaptation of the eye, and who works a good deal with the testing of thresholds, is in danger of forgetting that what his patients need is the optimum—the best condition for eye work. By increasing the light on his test cards to double, or four times the usual he will always find the patient able to correct his mistakes, or read another line and may sometimes get him to read 12/6, instead of 6/6. Such an increase in light and sight will mean an enormous increase in the efficiency, comfort, and safety of his patient, if his patient is a bookkeeper, or a needlewoman. To advise better light to work by, may be a prescription troublesome and difficult for the patient to carry out, but it is often worth more to the patient than anything else that can be done for him, and may be correspondingly valuable to the prescriber who takes the trouble to see that it is carried out.

One thing more; a good light is one that comes in the right direction. Eclipse blinding proves to us that the sun is too bright to be looked at. The lamp of a lighthouse may be too bright to be looked at, unless it is seen on the horizon, ten or twenty miles away. When we start to motor in the mountains, with the sun on our backs, its 10,000 foot-candles, on the forests and canyons, is never too bright, but as we go west and the sun sinks low in the sky, we have to turn down the shade to save our eyes from its blinding light. The use of electric lights for ornament has confused the popular mind as to good lighting. They may be pretty and effective to look at, but they do not furnish a light to work by. The dread of bright light is the dread of having bright light shining on our eyes. The need for bright light is to have it shine on the thing we have to look at.

Edward Jackson.

### SHORT COURSES FOR SPECIALISTS

Two of the annual, short, graduate courses in ophthalmology have just

been completed, one in Denver and the other in Rochester, New York. Both are examples of the best type of condensed course. The Denver course is probably the first of its kind, having been initiated by Dr. Edward Jackson fourteen years ago. It has always been popular and has been the model for its many successors. There are now at least a half dozen similar courses given throughout the country. Whether the supply will not shortly exceed the demand remains to be seen.

It has been interesting to note the type of individual in attendance. Most of them are in middle life or older. These physicians are unable to leave their practices for a prolonged period, but feel the desirability of refreshing themselves on the newer methods of diagnosis and treatment. They probably receive a considerable amount of benefit, justifying the time and effort expended by those who give the instruction and by themselves in attending. That sufficient well-trained physicians are willing to make the sacrifices necessary to give this instruction, especially those who come from considerable distances at a real loss of time and money, is a splendid commentary on the altruism of our profession.

The Denver course was well attended and well received. Under the leadership of Dr. Jackson there has developed locally a strong group of ophthalmologists capable of giving a high type of teaching. In this annual course they give generously of their time and energy.

Denver was not at its best, as Colorado has shared in the heat and drought that the Middle West suffered in June and July, but the registrants did not let the hot weather interfere with regular attendance and unflagging interest. The climax was, as usual, the Colorado Congress, which was held on Saturday, July 25th. Many interesting papers were read. Some of these will be published in this Journal.

We congratulate Dr. Jackson for his farsightedness in initiating this course and for his spirit of youth which has been the motivating force that has carried it on through fourteen successful years.

Lawrence T. Post.

## BOOK NOTICES

**La radiographie en ophtalmologie. Atlas clinique.** By Prof. Edward Hartmann, 272 pages, 391 illustrations, cloth binding. Paris, Masson et Cie, French Ophthalmological Society, 1936, price not stated.

The French Ophthalmological Society annually presents to its members a volume of some modern work of exceptional value. Last year it was a review of the intracapsular operation for cataract, being a complete study of the work of various operators with conclusions as to the value of this method of operation.

That for 1936 consists of a magnificent octavo volume of 272 pages on finely surfaced paper on ophthalmic radiography. It is a clinical atlas prepared by Prof. Edward Hartmann of the Paris Hospitals and was presented at the annual meeting in Paris on May 12th of the present year, a rapidity of reproduction which is most creditable. It consists of a series of very excellent radiographs including the various positions of the face and orbits and of the sinuses with affections of the globe including

intraocular foreign bodies. Among the important plates are those of bony neoplasms, tumors of the orbit and adjacent regions, syphilitic growths, fractures, and radiographs of the lacrimal canals and of cerebral neoplasms involving the eyes. The radiographs of the different affections of the bones of the skull and face are exceptionally valuable including oxycephaly, hereditary cranial facial dysostoses, acrocephalosyndactylia, Paget's disease, neurofibromatoses involving the nasal sinuses, leontiasis ossea, the Schüller-Christian syndrome, and many other rare forms of osteal changes. The various techniques described with accuracy are those of Kohler, Dor, Belot, Fraudet, Holtzknecht, d'Altschul, Grudwinski, and also those of the Americans, Sweet and Dixon.

The volume forms a unique publication, the radiographs being beautifully delineated. The work should be in every radiographic laboratory as a basis of comparison, for such an array of rare pictures has never before been presented in any volume. It is very suitably dedicated to the memory of Prof. V. Morax.

Park Lewis.



# ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

## CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, history
19. Anatomy, embryology, and comparative ophthalmology

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#### CRYSTALLINE LENS

Chirkovskii, V. U., and Dimshitz, L. A. **Morphology of cataracts caused by light energy.** Awerbach jubilee volume, 1935, p. 578.

A report of two cases, one in a man 28 years old, and one year subsequent to therapeutic irradiation of the face; and the other in a boiler fireman 38 years old. Morphologically there is a similarity between the cataracts caused by infrared and radium rays, and both resemble saucer-shaped cataract. They are recognized by their location under the posterior capsule at the posterior pole, by their discoid form corresponding in size and shape to the pupil, and by their sharp demarcation from the clear portions of the lens. Capsular vacuoles, usually present in radium and X-ray cataracts and absent in glass-blower's cataract, are not a reliable diagnostic feature. The genesis of these cataracts is probably associated with disturbed nutrition of the lens, due to changes in the ocular vascular system, and injuries to the epithelium of the anterior capsule. The sensitiveness of the human lens to the action of light energy is much greater than is generally recognized. (Illustrations.)

Ray K. Daily.

Daniel, R. K. **Allergy and cataracts.** Trans. Sec. on Ophth., 1935, 86th annual session, pp. 50-55. (See Amer. Jour. Ophth., 1935, v. 18, Oct., p. 994.)

Denig, Rudolf. **Removal of swollen lens remains after operation for immature senile cataract.** Klin. M. f. Augenh., 1936, v. 96, April, p. 501.

If absorption of lens remains seems doubtful on account of its quantity, it ought to be removed within the first week after operation. Denig reopens the wound under the protection of a conjunctival bridge, an essential part of his method of cataract operation as here described.

C. Zimmermann.

Dimshitz, L. A. **Morphology of cataract associated with neurodermatitis.** Awerbach jubilee volume, 1935, p. 128.

The author reports the ninth case in the literature. The patient was 28 years old, and the cataract consisted of a progressive opacity of the anterior pole of the lens immediately under the lens capsule. The first visual disturbances appeared seven years after the appearance of the skin lesions. The author believes that inasmuch as the cutaneous lesions have a neurotic basis, a neurodystrophy may be the etiologic factor in the development of the cataract. (Illustrations.)

Ray K. Daily.

Ellett, E. C. **The results of cataract extraction five years and more after operation.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 341-352.

To obtain accurate information on the permanent visual results of cataract extraction the author studied 188 cases, including only those that had been under observation for from five to thirty years. Some of the more common causes of loss of vision are discussed and eleven case reports are included as to patients who did not retain useful vision. The loss was due to various causes and occurred at varying intervals after operation. C. Allen Dickey.

Esteban, Mario. **Concerning heat cataract.** Rev. Cubana-Oto-Neuro-Oft., 1936, v. 5, Jan.-Feb., p. 30.

Among some fifty blacksmiths the writer has observed two cataracts in persons of 47 and 50 years respectively, and wonders whether they were not occupational infrared cataracts.

M. Davidson.

Friedman, S. I. **A modified conjunctival suture in cataract extraction.** Averbach jubilee volume, 1935, p. 566.

This suture, introduced before the eyeball is opened, brings together the edges of a horizontal conjunctival incision 2 to 3 mm. in length made 2 to 3 mm. above the limbus. (Illustrations.)

Ray K. Daily.

Greenwood, A., and Grossman, H. P. **An analysis of 1,343 intracapsular cataract extractions by 48 operators following the Verhoeff method.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 353-364.

In this series of unselected cases the Verhoeff method was used by operators of varying experience. The capsule was ruptured in about five percent and vitreous was lost in six percent. This method can be employed successfully in all cases of cataract other than juvenile and traumatic. C. Allen Dickey.

Grosz, E. de. **Cataract extraction in 15,000 operations.** Arch. d'Ophth., 1936, v. 53, March, p. 161.

The paper is an analysis of experi-

ences in 15,050 operations for senile cataract over a period of thirty years.

Loss of vitreous occurred in 2.5 percent (1 percent in the extracapsular method, 4 percent in the intracapsular). Since retrobulbar injection of novocaine has been used the percentage of vitreous loss has declined. Postoperative infection declined from 1 percent during the first ten years to 0.4 percent in 1932. Strangely enough, the percentage of expulsive hemorrhage has increased from 0.08 to 0.59 percent since the use of retrobulbar injections.

Derrick Vail.

Kaminskaia, Z. A. **Clinical forms of senile cataract.** Averbach jubilee volume, 1935, p. 187.

A review of the literature and a classification of one hundred cases studied with the corneal microscope. The author divides cataracts into cortical, nuclear, and saucer-shaped. The study shows that in cortical cataracts the posterior cortex is most frequently involved; in relation to the slitlamp picture of this type of cataract, the subjective disturbances and reduction in visual acuity are amazingly mild. Saucer-shaped cataract the author cannot differentiate from complicated cataract, but the subjective disturbances are greater in proportion to the objective findings. Nuclear cataracts are characterized by absence of water clefts and disintegration of the lens. The author believes the various types of cataract probably have different etiologic factors. She considers saucer-shaped cataract related to the toxic and complicated type. Nuclear cataract may be purely a senile process, while posterior cortical cataract may be accounted for by some disturbance in the retrolental space.

Ray K. Daily.

Markiewicz, Stanislaw. **Comments on the Arruga and Hess forceps.** Klinika Oczna, 1936, v. 14, pt. 1, p. 63.

The author has modified the Arruga forceps so that they close only posteriorly, while the anterior edges remain apart. This was done to avoid including the iris in the grasp of the forceps when they are passed behind the

iris to grasp the lens capsule. The author has also modified the curved ends of the Hess iris forceps, making manipulation simpler. (Illustrations.)  
Ray K. Daily.

Müller, H. K. **The amount of acid-soluble organic phosphate in the healthy and diseased lens.** Arch. f. Augenh., 1936, v. 109, May, p. 497.

The investigations reveal that the lens loses with age and with the formation of cataract not only vitamin C but also its acid-soluble carbohydrate phosphate. Whereas the lenses of young cattle had 9.6 mg. inorganic and 32.3 mg. organic phosphate, the lenses of old cattle contained 8.8 mg. inorganic and 27.5 mg. organic phosphate. In the very opaque lenses the amount of organic phosphate was greatly reduced and in three cases none was found. The less opaque lens, too, showed a distinct decrease of organic phosphate. It is noteworthy that the inorganic phosphate was present in normal values and only exceptionally was it found increased or decreased. The author argues that the above findings give additional proof of his contention that the lens produces vitamin C from sugar with the aid of carbohydrate phosphate.  
R. Grunfeld.

O'Brien, C. S. **Detachment of the choroid after cataract extraction.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 325-341. (See Amer. Jour. Ophth., 1936, v. 19, Feb., p. 182.)

Ramirez Corria, C. M., Cuervo, L. V., and Manas, R. M. **A case of tetany and juvenile cataract from parathyroid insufficiency.** Rev. Cubana Oto-Neuro-Oft., 1936, v. 5, Jan.-Feb., p. 14.

The case reported is considered secondary to hypophysis insufficiency because of the coexistence of infantilism.  
M. Davidson.

Reiser, K. A. **On lenticonus posterior.** Klin. M. f. Augenh., 1936, v. 96, May, p. 641.

A case of lenticonus posterior in the right eye of a man of 37 years is described. Skiascopy indicated myopia of

3 D. in the normally curved peripheral parts of the lens and —16 D. in the area of the lenticonus. The slitlamp findings are illustrated, including remnants of the hyaloid artery and of the embryonic tunica vasculosa lentis. The literature, including 55 cases, is reviewed. The author regards lenticonus as an independent malformation of unknown origin. (Illustrations.)

C. Zimmermann.

Sourdille, P. G. **Intracapsular extraction of the lens.** Awerbach jubilee volume, 1935, p. 450.

An analysis of the results of 144 operations. In contradistinction to Pischel's statistics the author demonstrates that intracapsular extraction is the best method of extraction relative to visual results.  
Ray K. Daily.

Vajda, Geza v. **Cataract operations of the ophthalmic surgeon in the country.** Klin. M. f. Augenh., 1936, v. 96, May, p. 673.

Vajda describes the technique of his cataract operations on 480 eyes in the last six years, with statistics. He prefers bilateral operations in one sitting and extraction within the capsule.  
C. Zimmermann.

Vogt, Alfred. **A focal lamp for after-ataract operations.** Zeit. f. Augenh., 1936, v. 89, May, p. 140.

The slitlamp makes possible accurate observations of the thickness and nature of pupillary membranes and aids materially in deciding where to incise such a membrane. The importance of seeing all such details at the time of operation can hardly be overemphasized, and it is impossible with available lamps. Vogt, therefore, has designed a lamp (made by Zeiss) which projects a bright, real aerial image of an incandescent lamp filament into the plane of the membrane. He has used it in thirty operations and finds the illumination appreciably better than that given by any other lamp, in particular the Nitro-Hammer lamp.

F. Herbert Haessler.

Weeks, W. W. **Complicated after-ataract: its surgical treatment.** Trans.

Amer. Opth. Soc., 1935, v. 33, pp. 559-571.

Complicated after-cataract is described and the indications for operative interference are given. The de Wecker procedure is described in detail. The keratome incision is made just inside the limbus and the membrane is cut with a de Wecker scissors. Two cases are reported in which this method was used successfully.

C. Allen Dickey.

Wölfflin, E. **Two family trees of lamellar-cataract families.** Zeit. f. Augenh., 1936, v. 89, May, p. 129.

In the first of the two families, lamellar cataract occurred in eight members of five generations. The first three generations have been reported by Hosch in an inaccessible source. The first member was born in 1821 and was operated on successfully by an itinerant French oculist in 1829 (according to the statement of his still living 93-year-old son). This son was the only one of five children to be afflicted. Of his ten children, three daughters were similarly afflicted, and of the three children of one of them a son and a daughter had lamellar cataract. The latter has one affected daughter and two normal children. The father and grandfather of the first member of the family tree are said to have had normal eyes. Once the lesion appeared in the family, it seems to have been inherited as a dominant characteristic. It was transmitted only by an affected person and from male or female to male or female indiscriminately. These patients were free from rickets and spasmophilia but in all of the last five members striking horizontal nystagmus was present.

The second family tree involves only three generations. A female who became blind by her sixteenth year was successfully operated on for lamellar cataract. Of her seven children, one boy and one girl had lamellar cataract and no rickets or spasmophilia. The only daughter of the afflicted female of the second generation had cataract but not of the lamellar type. A ring of punctate opacities involved the posterior cortex. Later a few spicules developed anterior

to the punctate opacities but the equatorial and anterior cortex always remained free. F. Herbert Haessler.

Wright, R. E., and Nayar, K. K. **Pigmented deposits in the lens and cornea of doubtful nature.** Brit. Jour. Opth., 1936, v. 20, May, p. 295. (See Section 6, Cornea and sclera.)

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### RETINA AND VITREOUS

Adroque, E., and Malbran, J. **Exudative retinitis and retinal cysts.** Arch. de Oft. de Buenos Aires, 1936, v. 11, March, p. 83.

On the basis of a review of the literature and of a case followed for fourteen years in which an exudative retinitis in one eye evolved into retinal cysts, the authors arrive at the conclusion that the two diseases are stages of the same polymorphous entity and that while in exudative retinitis the vascular changes noted, if any, are secondary, in angiomas they are primary; and that therefore there is no relation between the two. Pigmented lesions in the periphery of exudative retinitis have been noted often enough to constitute part of the disease entity. The etiology is either lues or tuberculosis. The case reported was due to lues. The cysts are cicatricial in origin. (Fundus photographs.) M. Davidson.

Avizonis, P. **Results of diathermic coagulation of retinal detachment in the clinic at Kaunas.** Awerbach jubilee volume, 1935, p. 28.

Brief clinical reports of 43 electrocoagulations on 25 patients with retinal detachment, with sixty percent satisfactory results. The chief merit of this procedure lies in the fact that accurate localization of the retinal tear is unnecessary. The author attributes failures to inability to gage the dosage accurately, which results in excessive or insufficient coagulation in some cases. (Visual fields.) Ray K. Daily.

Casanovas, J. **Cystic degenerations and cysts of the retina.** Arch. de Oft. Hisp.-Amer., 1936, v. 36, May, pp. 239-272.



This article does not lend itself very well to abstract. The author discusses at length cystic degeneration found in the retina at the equator (cystic degeneration of Iwanoff), cystic degeneration of the macula, and cystic degeneration accompanying other retinal conditions such as albuminuric diabetic retinitis, retinitis circinata, Coats's and Hippel's disease, glioma of the retina, sarcoma of the choroid, and detachment of the retina. He reports some of the clinical findings, with microscopic studies. Cysts of the retina are also briefly discussed. In regard to cystic degeneration at the equator, the author does not believe that it is a result of senility, because he has been able to find it in young patients. Some other cystic degenerations are due to edema from circulatory disturbances and the formation of cavities which, if fused together, may reach the size of a larger cyst. (Bibliography, 9 photomicrographs.)

R. Castroviejo.

Charlin, Carlos. **The pathogenesis of albuminuric retinitis.** *Ann. d'Ocul.*, 1936, v. 173, April, pp. 285-292.

A series of cases of albuminuric retinitis showed marked improvement or total disappearance of the retinitis when placed on a strict low protein diet. On this regimen there was also loss of headache and nausea and gain in weight. But in spite of the clinical improvement marked hypertension, sclerosis of the retinal vessels, and laboratory evidence of renal insufficiency remained or increased. Some of the patients that had been cured of severe retinitis by the low protein diet died later in coma without return of the retinitis. In some cases there was neither retinal nor general improvement when the protein intake was restricted. Charlin considers that albuminuric retinitis is the result of general intoxication by an abnormal intermediate product of protein metabolism:

John C. Long.

Chechik-Kunina, E. A. **A rare case of remains of the embryonal vascular system.** *Awerbach jubilee volume*, 1935, p. 571.

A review of the literature and a report of a case of an unusual formation in the right eye of a myopic boy. A bluish-white membrane holding red blood vessels stretches forward from the nasal portion of the disc into the vitreous. There it spreads into a thin branching veil extending forward and externally. The upper outer branch of the central vein makes a forward curve passing through the veil in its course. The author considers this a congenital anomaly having no relation to the myopia. (Illustrations.) Ray K. Daily.

Cooke, C. T. **A new electrode for surgical diathermy of the retina.** *Arch. of Ophth.*, 1936, v. 15, April, pp. 711-712.

The electrode consists of a curved iridioplatinum pin 0.3 mm. in diameter, and varying in length from 1 to 2.5 mm. J. Hewitt Judd.

Damel, C. S. **Anatomy of the orbital and neural parts of the central artery and vein of the retina.** *Arch. de Oft. de Buenos Aires*, 1936, v. 11, March, p. 57.

Damel's histologic sections show that the central vessels in their passage through the dural perforation are not intimately adherent to it but are surrounded by more or less distinct fissures. But Damel does not share Behr's notion of their function as channels for drainage of the intervaginal cerebrospinal fluid. The intervaginal vessel sheath is from arachnoid and in its neural course the vessels gain sheaths from pia and glia. Sometimes the artery and vein run in separate compartments. There are connective tissue foramina in the lamina cribrosa for passage of the central vessels and their branches. While the artery is terminal and no anastomoses with the vascular plexus of Zinn have been encountered, the central vein does receive tributaries from the choroidal, scleral, and neural veins, just as the ophthalmic vein receives anastomoses from the facial, temporal, and lacrimal veins. (Photomicrographs.) M. Davidson.

Damel, C. S. **Anatomy of retinal vessels.** *Arch. de Oft. de Buenos Aires*, 1936, v. 11, April, p. 153.

In a complete review of the histology of the retinal circulation, Damel points out that the branches run sometimes deeply in the retina, displacing and invading even the external plexiform layer when of large size, quite apart from the presence of the terminal plexus in the internal granular layer. The division of the central artery into its two branches occurs on the disc in 71 percent of cases studied. The arteries are most frequently in front of the vein and the most frequent arteriovenous crossings are in the superior temporal vessels. The perivascular spaces are regarded as tissue spaces in communication with the cerebrospinal fluid but not true lymphatic channels. Photomicrographs.

M. Davidson.

Diaz Dominguez, Diego. **Gonin's operation for retinal detachment.** Arch. de Oft. Hisp.-Amer., 1936, v. 36, May, pp. 225-239.

Report of seventeen cases of retinal detachment operated upon following Gonin's technique of thermocautery.

R. Castroviejo.

Edgerton, A. E. **Circinate retinitis.** Amer. Jour. Ophth., 1936, v. 19, June, pp. 463-469.

Fralick, F. B., and Peet, M. M. **Hypertensive fundus oculi after resection of the splanchnic sympathetic nerves.** Arch. of Ophth., 1936, v. 15, May, pp. 840-846.

The authors report a series of ninety patients with essential hypertension who were subjected to bilateral resection of the splanchnic nerves. In 36 cases the results have been checked several months postoperatively. Five patients were symptom-free with normal blood pressure. Resolution of the fundus changes of malignant hypertension took place in two and of an angiospastic retinitis in one. The fundus changes in the two remaining cases could not be followed. Eighteen patients showed an appreciable drop in blood pressure with general symptomatic improvement, but in only three of these were there signs of improvement in the fundi. Thirteen patients in whom no lowering of blood pressure was obtained showed no im-

provement in appearance of the fundus. The presence of marked changes in the fundus has not been found to be a contraindication to operation, as three patients who showed the most severe hypertensive neuroretinitis with severe organic vascular changes made the best response to operation.

J. Hewitt Judd.

Gesell, A., and Blake, E. M. **Twinning and ocular pathology, with a report of bilateral macular coloboma in monozygotic twins.** Arch. of Ophth., 1936, v. 15, June, pp. 1050-1071.

The remarkable duplication of bilateral macular coloboma in twin girls aged twelve years is reported in detail, with drawings of the fundi of the four eyes. The physiology of twinning with its relationship to ocular conditions is discussed and the literature on ocular correspondence in twins is summarized. The hereditary aspects of coloboma and the genesis of atypical coloboma in twins are reviewed. (Bibliography.)

J. Hewitt Judd.

Guist, G., and Seidel, F. **Concerning the treatment of retinitis pigmentosa.** Med. Klinik, 1936, v. 32, March 13, pp. 350-352.

Retinitis pigmentosa is considered by the authors an endocrine disturbance with faulty mineral salt metabolism (chloride retention), and insufficient utilization of oxygen (shallow respiration, lowered metabolism). The treatment suggested consists in doses of an individually prepared hormone mixture and pure oxygen, and, in those cases in which there is much retention of chlorides, doses of renal lipoids. The result of persistent treatment is considerable and permanent enlargement of the visual field.

Bertha Klien.

Jancke, G. **"Congestive retina" and "cyanosis retinae" in diseases of the blood and circulation.** Klin. M. f. Augen., 1936, v. 96, May, p. 605.

A woman of 36 years, affected with emphysema, relative cardiac insufficiency, and dyspnea, complained of headaches and severe visual impairment. The intense retinal edema and hemorrhages, with engorgement of the retinal

veins, subsided within three months, with normal vision. For this clinical picture the author proposes the term "congestive retina." It differs from cyanosis retinae in primary polycythemia, which shows dark bluish discoloration of the retinal vessels and fundus and later secondary dilatation and tortuosity of the veins. (Illustrations.)

C. Zimmermann.

Keller, J. M. **Retinal periphlebitis in septic endophthalmitis and its ophthalmoscopic picture.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 520-533.

Keller discusses the anatomic and histologic aspects and describes the lesions of retinal periphlebitis found in chronic diseases of the uveal tract. A case is reported of a perforating scleral wound which progressed favorably until the eleventh day, when the eye became painful and red with the vitreous cloudy. Improvement followed milk injections, and about three weeks later ophthalmoscopic examination revealed several small white round spots along the course of the veins, especially in the nasal retina. They increased in number during the next week. Four days later they had disappeared entirely. This demonstrates that in endophthalmitis septica a retinal periphlebitis may occur as a separate disease independent of general participation of the retina in the inflammation. C. Allen Dickey.

Kiewe, P., and Reh, J. **Hole-like affection of the macula.** Klin. M. f. Augenh., 1936, v. 96, April, p. 448.

A woman of 37 years presented a slight retinopapillitis of the right eye and a holelike change of the macula with moderate impairment of vision. After removal of a diseased right first upper molar tooth the retinopapillitis subsided with improvement of sight. The macular affection remained over nine months, finally showing a circumscribed lesion of the pigment epithelium. Ophthalmoscopic examination in red-free light excluded the formation of a hole, and accelerated settling time of the red blood corpuscles indicated the presence of a septic focus. (Colored plate.)

C. Zimmermann.

Kraupa, Ernst. **Retinal tears.** Zeit. f. Augenh., 1936, v. 89, May, p. 136.

Deutschmann's assertion that no one had previously observed the development of retinal detachment from its inception in a tear was not true. Kraupa had reported such an observation in 1923. He now adds a further observation. A student came, after a night of dancing, with a retinal detachment and a small hole in the retina. Operation was refused. One year later the retina had become reattached and the hole persisted. Later another detachment occurred. Anyone who had missed the hole on first examination might assume that it occurred as a result of the last detachment. In a third patient, a retinal hole was clearly seen to result from traction of a strand of blood clot following retinal hemorrhage in hypertension.

F. Herbert Haessler.

Krause, A. C. **The chemistry of the retina. 2. Chemical constitution.** Amer. Jour. Ophth., 1936, v. 19, July, pp. 555-557.

Lindner, K. **Clinical study of the vitreous. I. Contraction of the vitreous.** Graefe's Arch., 1936, v. 135, p. 332.

To the contraction of the vitreous almost always present when a vitreous mass is elevated from posteriorly, the author has clinically observed its increased constriction after occurrence of the retinal tear, as well as the subsequent partial liquefaction of this raised vitreous. Using young rabbits not over four months old, electrocoagulation of the sclera in the region of the equator is performed over an area 3 to 4 mm. in diameter. A trephine of 1.5 to 2.5 mm. cross section is then used to penetrate this coagulated part of the sclera and the underlying choroid and retina. The trephined flaps are removed and a conjunctival suture inserted. Within three hours the anterior chamber begins to deepen. The latter continues until the chamber becomes very deep with the iris presenting a definite step or the shape of a funnel posteriorly. Other experiments are described. The author concludes that the content of albumen in the aqueous or perhaps related



changes in the aqueous play the principal rôle in contraction of the vitreous.

In a human eye with glaucoma, stony-hard and the anterior chamber almost absent, it was possible to produce acute and prolonged hypotony by application of a vitreous fistula and simultaneous irritation of the iris by subconjunctival injection of 0.2 c.c. of a ten percent sodium chloride solution. The acute hypotony produced by acute contraction of the vitreous is probably due to a suddenly increased percolation of the aqueous through the mass of the vitreous.

H. D. Lamb.

Maniukova, H. K. **Lysate therapy in retinitis pigmentosa.** *Sovietskii Viestnik Opht.*, 1936, v. 8, pt. 3, p. 348.

The rationale of this therapy is based on the fact that lysates stimulate cell metabolism, and their use in retinitis pigmentosa is an attempt to stimulate the biologic processes of dying cells. Forty-three patients were treated with injections of tissue extracts of retina, liver, pituitary, adrenal, cortex, and corpus luteum. In 58 percent of the cases there was a temporary improvement manifesting itself in increased adaptation, improved visual acuity, and extended fields.

Ray K. Daily.

Markus I. M., and Youdkevich, D. B. **Morphologic and biochemical studies of the blood in lysate therapy of retinitis pigmentosa.** *Sovietskii Viestnik Opht.*, 1936, v. 8, pt. 3, p. 388.

Detailed study of the morphology of the blood in twelve cases of retinitis pigmentosa shows chloranemia, which suggests an endocrine disturbance. Changes in nitrogen, cholesterol, and bilirubin content indicate pathology in the liver. Changes in the potassium and calcium ratio point to involvement of the vegetative nervous system. Lysate therapy normalizes the morphology of the blood, and its nitrogen and cholesterol content, but it does not influence the bilirubin and mineral content, which shows that lysates do not affect the status of the vegetative nervous system.

Ray K. Daily.

Merkulov, I., and Kopit, P. **Lysate therapy in retinitis pigmentosa.** *Soviet-*

*skaa Viestnik Opht.*, 1936, v. 8, pt. 3, p. 369.

A detailed report of thirteen cases treated with ocular and liver lysates. The tables show definite functional improvement as measured by adaptation, visual acuity, and visual fields. The fundus pictures remained unchanged. (Visual fields.)

Ray K. Daily.

Morax, V. **Medical comments on retinal detachment.** Awerbach jubilee volume, 1935, p. 312.

The fact that seventeen percent of cases of retinal detachment are bilateral demonstrates the necessity for prophylactic measures to save the uninvolved eye. The histories of his private patients convinced Morax that retinal detachment had a luetic basis. The fact that antiluetic therapy has no effect on retinal detachment is to the author no argument against the luetic etiology, for in parenchymatous keratitis antiluetic treatment is also ineffectual. Nor are negative serologic reactions conclusive. He therefore insists on four to five years of intensive antiluetic therapy for cases of retinal detachment, and in those cases which submitted to this treatment the other eye remained uninvolved.

Ray K. Daily.

Nagy, M., and Incze, K. **The relation of hypovitaminosis to dark adaptation.** *Arch. f. Augenh.*, 1936, v. 109, May, p. 567.

The vitamin contents of the meals of children from three different schools were carefully measured. Though they were found to vary from 1,000 units in one school to 246 in another and 162 in a third school, the dark adaptation ability of the children of all three schools was about the same. A great difference, however, was encountered between spring and autumn values. A change for the worse occurred in the spring equally in all three schools. The authors believe that the effect of the vitamin-rich food of the children living in the center of the city was counteracted by the anemia of the children due to city habitation, while the effect of the vitamin-poor food of the children living in the



outskirts was compensated by their increased exposure to sunlight and air.

R. Grunfeld.

Orr, H. C., and Young, J. H. **Acetylcholine in embolism of the retinal artery.** *Brit. Med. Jour.*, 1935, June 1, p. 1119.

A case of embolism is reported in which subconjunctival injections of acetylcholine resulted in improvement of vision from 6/18 to 6/4 and complete restoration of the visual field.

Edna M. Reynolds.

Reese, A. B. **Massive retinal fibrosis in children.** *Amer. Jour. Ophth.*, 1936, v. 19, July, pp. 576-582; also *Trans. Amer. Acad. of Ophth. and Otolaryng.*, 1935, 40th annual meeting, p. 145.

Rosenblum, M. E. **Retinal detachment with separation at the ora serrata.** *Awerbach jubilee volume*, 1935, p. 388.

A review of the literature and an analysis of the author's own cases. Of 131 cases of retinal detachment ten percent were with separation at the ora serrata. They may be traumatic as well as idiopathic, and are found usually in nonmyopes under 35 years of age. The separation is as a rule in the lower portion of the fundus, and only in traumatic cases is separation seen above. The author treats them by electrocoagulation as used by Weve and Safar.

Ray K. Daily.

Sobański, J. **Circulation of blood in the retina under physiologic conditions.** *Graefe's Arch.*, 1936, v. 135, p. 372.

Eighty persons varying in age between 7 and 73 years with normal vascular conditions were investigated regarding the venous and arterial pressure in the retina and the general vascular tension. The retinal venous tension varied on an average between a minimum of less than the intraocular tension (16 to 22 mm. Hg) and a maximum of 28 mm. Hg for normal subjects of 7 to 15 years old, and a minimum of 23 mm. Hg and a maximum of 36 mm. Hg for normal individuals over 40 years of age. The retinal arterial tension in subjects between 7 and 15 years averaged

68/40 mm. Hg; over 15 and up to 75 years it averaged 56/48 mm. Hg, with a maximum of 90/80 mm. Hg. The relation of the minimal venous to the minimal arterial pressure varied between 1 to 1.9 and 1 to 3. The relation of retinal arterial tension to general blood-pressure varied between 1 to 1.3 and 1 to 1.6.

H. D. Lamb.

Storcheim, F., and Taube, E. L. **Fundus findings in tuberous sclerosis.** *Amer. Jour. Ophth.*, 1936, v. 19, June, pp. 508-509.

Sugita, Yozo. **Colloidal chemical observations on the fine structure of the retina and the color of the fundus.** *Graefe's Arch.*, 1936, v. 135, p. 187.

When the retinal layers in the eyes of men, rats, and frogs are stained with substantive coloring matters and particularly oxamin-blue, the cellular micellae and the micellar interspaces are found to be smallest in the rod-cone layer and greatest in the cell nuclei of the outer and inner nuclear layers and in the nuclei of the ganglion and pigment-epithelium cells. The very small micellae in the cones of the macula would explain the yellow color of that region in comparison to the red color of the remainder of the fundus, according to Ostwald's theory (*Ostwald, W., Handbuch der Kolloidwissenschaft*, v. 1: *Licht und Farbe in Kolloiden*, part 1). That author established the fact that according to the size of the colloidal particles their natural color varied. From largest to smallest, it was as follows: green, blue, violet, red, orange, yellow.

H. D. Lamb.

Szily, A., and Machemer, H. **Further contributions to the electrolytic treatment of retinal detachment.** *Klin. M. f. Augenh.*, 1936, v. 96, Feb., p. 191.

In employing the usual unipolar electrolysis the authors observed undesirable effects on parts distant from the field of operation. Hence they substituted bipolar electrolysis. The essential of this modification is to limit the action of the current in the eye by closely approximating the two poles to each other, so that the electric current can

penetrate only a small section of the eye. They found this decidedly local stimulation in surface and perforation electrolyses to be the most effectual and least harmful procedure. Up to May, 1935, 31 cases were treated in this way (40 operations in all). Of these, 18 healed with total reattachment and good vision, 4 were improved, and 9 almost hopeless cases showed no results. (Illustrations.) C. Zimmermann.

Uyama, Yasuo. **Experimental tuberculous periphlebitis retinae with particular reference to the state of immunity in the animal experimented upon.** Graefe's Arch., 1936, v. 135, p. 364.

Rabbits were injected subcutaneously with dilutions of old tuberculin in seven animals, "tuberculococcigen" in nine, and fat-free vaccine in ten animals. A small quantity of an emulsion of living tubercle bacilli was injected into the left ventricle of these prepared rabbits as well as into fourteen control animals not previously treated with antigen. After an interval of seventy to ninety days, the eyes of all the rabbits were studied ophthalmoscopically and anatomically. In four eyes from four animals previously injected with antigen, a periphlebitis of the retina was discovered by microscopic examination of these fifty-two enucleated eyeballs. Only in one eye among the fourteen control animals was a periphlebitis retinae discovered anatomically. In all five affected eyes, the cells infiltrating the retinal veins were lymphocytes and epithelioid cells. H. D. Lamb.

Vercelli, Giuseppe. **Sudden and definitive blindness in a patient affected by old cranial trauma, hydrocephalus, and primary atrophy of the disc.** Riv. Oto-Neuro-Oft., 1935, v. 12, Nov.-Dec., pp. 711-720.

A man of 39 years who during the World War had sustained a wound of the left parietal region and had been recently affected by attacks of hemiparesis, dizziness, and bilateral amaurosis, became suddenly blind and unconscious. His examination showed right optic atrophy, filiform retinal arteries and partial atrophy in the left eye, and

symptoms of hydrocephalus. The writer assumes that the syndrome was due to a persistent attack of spasm of the central arteries of both retinas arising from intracranial hypertension secondary to the old trauma. (Bibliography, 2 figures.) M. Lombardo.

Visser-Heerema, J. **The specific weight of the fluid gained at retinal detachment operations.** Arch. f. Augenh., 1936, v. 109, May, p. 543.

The author found regularly an increase in the specific weight of the subretinal fluid according to the age of the detachment. The fluid was collected by a capillary U tube at the operations. Detachments which took their origin in the upper half but sank quickly had a subretinal fluid of higher specific gravity than those detachments which became baggy. The specific gravity of the vitreous does not differ much from that of the subretinal fluid so that the sinking of the detachment cannot be explained purely by gravitation.

R. Grunfeld.

Walker, Clifford. **Pupil goggles. Electrodes for diathermic heat. Galvanic unit.** Trans. Amer. Ophth. Soc., 1935, v. 33, p. 404.

The author exhibited a pair of aluminum pupil-goggles in a standard frame, two forms of electrode for applying diathermic heat to the eye, and a galvanic unit with a three-way switch which enables the operator to use galvanic or diathermic treatment with the same scleral electrode.

C. Allen Dickey.

Walker, C. B. **Special device for localization and treatment of retinal tear with galvanic current.** Arch. of Ophth., 1936, v. 15, June, pp. 1094-1097.

The instrument pictured and described permits the passage of a 25 percent iridium-platinum micro-needle with a diameter of 3/1000 inch through a 25-gage stainless steel or platinum cannula attached to a 2-c.c. hypodermic syringe, fitted with a piston chuck to hold the needle and a guide bar which can be adjusted to allow any depth of penetration desired. The tip of the can-

nula has two sharp spurs to prevent slipping. The use of the instrument is discussed.  
J. Hewitt Judd.

Walker, C. B. **Surgical treatment of separated retina by the galvanic method.** Amer. Jour. Ophth., 1936, v. 19, July, pp. 558-570; also Trans. Amer. Ophth. Soc., 1935, v. 33, p. 48.

Weve, H. **Retinal detachment caused by foveal hole cured by diathermy.** Arch. f. Augenh. 1936, v. 109, May, p. 534.

Three cases described were treated with a special perforation electrode simultaneously serving as a light source. The external rectus muscle and also the superior or inferior rectus muscle, as the case might be, were severed, and the eyeball turned and luxated to reach the fovea. The author emphasizes the necessity of localizing the tear accurately, since a delimiting operation in the macular region would be followed by great damage to vision. The results regarding restoration of vision were not particularly good, but good visual fields were obtained.  
R. Grunfeld.

Würdemann, H. V. **The formation of a hole in the macula.** Amer. Jour. Ophth., 1936, v. 19, June, pp. 457-463.

# 11

## OPTIC NERVE AND TOXIC AMBLYOPIAS

Charlin, C. C. **Acute bilateral retrobulbar optic neuritis.** Arch. de Oft. Hisp.-Amer. 1936, v. 36, Feb., pp. 77-90.

The author reports fourteen cases of acute bilateral retrobulbar optic neuritis. The symptoms found in this type of case may be a complication of general infection (grippe) which brings about marked congestion of the paranasal region. This condition would strangle the optic nerves in the optic canals and produce a hyperemia of the meninges which would explain the severe headache. The sudden improvement of vision obtained by operating on the sinus may be explained by freeing of the optic nerves in the optic canals.  
R. Castroviejo.

Frost, A. D. **Papilledema with special reference to papilledema associated with sinus disease.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 480-507.

The author classifies papilledema and discusses the fundus findings, subjective symptoms, field changes, and pathology of this condition. Two cases are reported in which there were enlarged blind spots and central scotomata with marked reduction of vision. Improvement followed nasal packs and, after aëration of the posterior sinuses was effected surgically, the vision returned to normal. The author offers as an explanation either mechanical pressure or true inflammatory involvement. If the stasis is permitted to exist for some time a mild inflammatory or toxic effect may be produced by the edema itself, thus causing a true axial neuritis.  
C. Allen Dickey.

Gasteiger, H. **The value of roentgen diagnosis in doubtful affections of the optic nerve.** Klin. M. f. Augenh., 1936, v. 96, May, p. 589.

By six cases Gasteiger shows the diagnostic value of antero-posterior, bitemporal, and stereoscopic X-ray pictures of the skull. The pictures revealed calcification and arteriosclerosis of vessels (especially the internal carotid), which by pressure on the nerve or trophic disturbance produced visual impairment. Such changes explain atrophic excavation in pseudoglaucoma (without hypertension) and in cases of retrobulbar neuritis without ophthalmoscopic alterations. (Illustrations.)  
C. Zimmermann.

Hesse, Erich. **The therapy of methyl alcohol amblyopia.** Zeit. f. Augenh., 1936, v. 89, April, p. 51.

After three days of fasting a man drank 100 c.c. of methyl alcohol diluted with an equal volume of water. Seven to ten c.c. is considered necessary to produce blindness and 30 c.c. the lethal dose. The patient's visual disturbance was so severe that he had to be led. He was seen in the eye clinic six days after the suicidal attempt and was treated with four lumbar punctures with extensive withdrawal of fluid on four occa-



sions in the ensuing ten days. When last examined eight months later, his visual acuity was 0.9 and 0.8 in right and left eyes respectively. In the right eye, colors were recognized with central fixation, though in a small nasal area red was called yellow. The left eye has a large absolute scotoma contiguous to the blind spot.

F. Herbert Haessler.

Igersheimer, Joseph. **Pathogenesis and therapy of tabetic optic atrophy.** Averbach jubilee volume, 1935, p. 151.

A comprehensive review of the literature and a brief reference to the author's work, which demonstrated spirochete-containing foci in the pia, arachnoid, and the neuroglia of the optic nerves but never in the nerve tissue. The author is convinced that the disease begins at the borders of the nerve and enters from the perineural spaces. He believes that the orbital or the intracranial portion of the nerve may be the primary seat of the disease. After discussing the various therapeutic procedures he concludes that the therapy of optic atrophy is still in the research stage.

Ray K. Daily.

Lokshina, S. I. **Tobacco toxicosis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 3, p. 464.

The writer discusses the rôle of methyl alcohol, present in tobacco leaves and in prepared tobacco, in tobacco amblyopia.

Ray K. Daily.

Michail, D., and Benetato, G. **Researches on the respiration of the optic nerve.** Arch. d'Opht., 1936, v. 53, May, p. 346.

The oxygen consumption of human optic nerves was investigated by the manometric method of Warburg. These researches show that the therapeutic practice which results from the theoretic conception that the optic atrophy of tabes is due to a diminution of respiratory exchanges of the optic nerve is completely false. (Bibliography.)

Derrick Vail.

Much, Viktor. **Amyl nitrite in the treatment of diseases of the optic nerve.** Zeit. f. Augenh., 1936, v. 89, April, p. 58.

The author treated eight cases of optic neuropathy with amyl-nitrite inhalations. In five cases the disease was retrobulbar, in all probability a toxic amblyopia due to alcohol or tobacco; at least no other probable etiologic factor could be found. In every case there was distinct improvement, in six cases complete cure. The vasodilatation produced by the amyl-nitrite causes hyperemia of the choroid and retina, and therefore improves the metabolism of the tissues.

F. Herbert Haessler.

Ochapovskii, S. V., Menshutina, M. A., and Sharkovskii, I. S. **Data of the Kuban Eye Clinic for twenty years relative to pathology of the optic nerve.** Averbach jubilee volume, 1935, p. 320.

Etiologic and pathologic classifications of 1,738 cases of diseases of the optic nerve. The tables demonstrate the bizarre etiology of the disease, and the fact that various pathologic processes may be caused by the same etiologic factor.

Ray K. Daily.

Paton, Leslie. **Papilledema and optic neuritis.** Trans. Sec. on Ophth., Amer. Med. Assoc., 1935, 86th annual session, p. 98. (See Amer. Jour. Ophth., 1936, v. 19, July p. 622.)

Serr, H. **Choked disc in its general clinical and ophthalmologic significance.** Graefe's Arch., 1936, v. 135, p. 431.

The author discusses choked disc regarding its pathogenesis, differential diagnosis from optic neuritis and pseudoneuritis, its occurrence following injuries to the skull, and the great importance of referring cases with this condition to the brain surgeon very early.

H. D. Lamb.

Sobański, J. **The production of tabetic optic atrophy and its treatment.** Graefe's Arch., 1936, v. 135, p. 401.

Tabetic optic atrophy occurs when the diastolic pressure in the central retinal artery is less than twice the intraocular tension. In a table are listed 33 cases of tabetic optic atrophy in which the diastolic pressure in the central artery of the retina so nearly approached



the ocular tension that the latter was actually higher than the diastolic blood pressure in the retinal capillaries. Of the 33 patients, 20 had lost all vision in one eye. As well as antiluetic treatment and tonics, all the cases received miotics. In 24 eyes cyclodialysis was performed and in one eye cyclodialysis and iridencleisis. Improvement was noted in 36 eyes out of 46 which had some vision when this treatment was begun. In five eyes the vision remained unchanged and in five it grew worse.

H. D. Lamb.

Soriano, S., and Malbran, J. **Toxic amblyopias from hair-dyes (lead compounds).** Arch. de Oft. de Buenos Aires, 1936, v. 11, April, p. 222.

Toxic amblyopia should be a term reserved for cases without inflammatory etiology and retrobulbar neuritis for those with it. One case is reported in a man who had used an acetate of lead dye for several years. Discontinuation of the dye led to slight improvement only after several months' observation. The other case was of a woman with bilateral central scotomata and postneuritic optic atrophy in whom radiograms of the head showed extremely opaque hair but so far instead of lead only silver was demonstrated in the dye at present used. Probably a lead compound had been used before.

M. Davidson.

Sorsby, Arnold. **Ocular lesions in bony dystrophies.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 499.

The author favors and reproduces Waardenburg's classification of cranial deformities. Oxycephaly appears in three other clinical varieties, acrocephalo-syndactyly (Apert) cranio-facial dysostosis (Crouzon) and hypertelorism (Greig). Ocular lesions in association with digital abnormalities are classified as (1) arachnodactyly (2) syndactyly with aniridia (3) polydactyly with retinitis pigmentosa (4) Lawrence-Moon-Biedl syndrome (5) brachydactyly and microcornea (6) lobster-hand and aniridia (7) apical dystrophy of hands and feet and macular coloboma.

Beulah Cushman.

Wolff, Eugene. **The causation of amblyopia following gastric and other hemorrhages.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 342.

The author associates amblyopia following such hemorrhages with vascular spasms similar to those of quinine amblyopia. Quinine inhibits the oxidizing power of protoplasm and diminishes the oxidizing power of the blood. Similarly the hemoglobin content of the blood is reduced by the repeated hemorrhages, and the amblyopia may correspond to a time when the hemoglobin content and oxygen supply to the tissues are reduced and spasm of the vessels develops. The histopathologic findings in eyes with amblyopia following hemorrhages tend to show that the essential lesions are in the retina. This does not conflict with the suggestions as to vascular spasm.

Beulah Cushman.

## 12

### VISUAL TRACTS AND CENTERS

Aubineau. **Subjective ocular disturbances following cranial trauma.** Ann. d'Ocul. 1936, v. 173, March, pp. 205-207.

After head injuries with loss of consciousness, subjective visual disturbances without demonstrable injury may be visual or asthenopic. On physical exertion or on changing the position of the head there may be giddiness and a sensation of displacement of objects. This sensation lasts for a short time and then abruptly ceases. The asthenopic symptoms are independent of refractive errors, accommodation, or muscular imbalance. Fixation on an object causes exhaustion and sometimes slight ptosis. These symptoms are part of a commotional syndrome and may be due to microscopic brain lesions, corticomeningeal adhesions, vasomotor disturbances, alterations of the cerebrospinal fluid, or other causes.

John C. Long.

Farberow, B. J. **Roentgenogram of the head in neurofibromatosis of Recklinghausen.** Zeit. f. Augenh., 1936, v. 89, April, p. 81.

In three patients the most frequent changes were deformities of the facial

bones. Extensive hyperplasia is rare. Enlargement of the sella occurs most frequently when there are tumor masses in the orbit. Then the optic canals are usually enlarged and defects in the orbital walls are not uncommon. Roentgenograms give no evidence that the hypophysis is involved in the development of neurofibromatosis. Systematic collection of more extensive material is advisable.

F. Herbert Haessler.

Johnson, T. H. **Homonymous hemianopia, practical points in interpretation, with report of 49 cases in which the lesion in the brain was verified.** Arch. of Ophth., 1936, v. 15, April, pp. 604-616.

Johnson analyzes the findings in 49 cases of hemianopia associated with verified brain tumor. He concludes that homonymous field defects, either complete or sectoral, indicate a lesion in the visual system posterior to the chiasm but do not locate the lesion in any specific area. In temporal lobe lesions the majority of the hemianopic defects are incomplete, crescentic defects being seen as frequently as quadrisectional defects. In lesions of the occipital lobe a complete hemianopia is much more likely, while hemianopia tends to be complete when found in frontal lesions.

J. Hewitt Judd.

Newton, F. H. **Paracentral homonymous hemianopic scotoma.** Amer. Jour. Ophth., 1936, v. 19, July, pp. 600-601.

Renedo, M. **Psychoneurosis of terror, amaurosis.** Arch. de Oft. Hisp-Amer., 1936, v. 36, March, pp. 139-143. (See Amer. Jour. Ophth., 1936, v. 19, May, p. 443.)

Scala, N. P., and Spiegel, E. A. **The pupillary reactions in combined lesions of the posterior commissure and of the pupillodilator tracts.** Trans. Sec. on Ophth., Amer. Med. Assoc., 1935, 86th annual session, p. 184. (See Amer. Jour. Ophth., 1936, v. 19, July, p. 625.)

Tichomirov, P. E. **Ophthalmoplegic migraine.** Awerbach jubilee volume, 1935, p. 481.

A brief review of the theories relative to the etiology of the disease and a report of a case of migraine in which the attacks of severe headache were followed by paralysis of the right extensor, lasting from three days to three months. These attacks occurred several times yearly. The author attributes the disease to a spasm of the posterior cerebral arteries causing edema of the nerve root or nucleus at the bottom of the fourth ventricle, or to a recurrent hemorrhage in the same area.

Ray K. Daily.

Worms, G. **Oculohypophyseal syndrome consecutive to a suppurative sphenoidal sinusitis.** Arch. d'Ophth., 1936, v. 53, March, p. 207.

The author reports the case of a pupil officer aged 21 years who had bilateral central scotoma beginning gradually and progressing after a few remissions to practical blindness (1/100) in each eye within a period of five to six weeks. The fields were concentrically contracted, and the pupils were dilated and almost paralyzed. The optic discs were somewhat edematous, the veins dilated, the arteries narrowed. The patient's appearance was decidedly of the adiposo-genital type. Roentgenograms revealed marked enlargement of the sella turcica with partial destruction of the posterior clinoid processes. No attention was paid to the sinuses, and a diagnosis of pituitary tumor was made. Operation not being permitted, radiotherapy was used, after which the headaches decreased, but vision did not improve. The patient became entirely blind with complete secondary atrophy two months later. Six years later he died of meningitis. Autopsy revealed a network of filamentary adhesions fixing the optic nerves and chiasm to the base of the brain, an enlarged congested hypophysis bathed in pus, and a well developed basal meningitis. On elevating the hypophysis a perforation of the posterior superior portion of the sphenoidal sinus was found. Both sphenoids were filled with polyps and pus. Histologic examination of the hypophysis did not reveal any adenoma, but showed chronic inflammatory reaction. The

author argues that the sinus infection was alone responsible for the inflammatory hypertrophy of the hypophysis and the bilateral optic neuritis. (References, illustrations.) Derrick Vail.

## 13

## EYEBALL AND ORBIT

Baltin, M. M. **Hyperostosis of the orbit.** Awerbach jubilee volume, 1935, p. 53.

In three cases exophthalmos and optic atrophy were caused by hyperostosis of the large and small wings of the sphenoid with narrowing of the optic canal. The patients were middle-aged women with a history of cranial traumatism. The author considers the process a manifestation of a pituitary disturbance initiated by the traumatism. Complete surgical removal is scarcely possible, and incomplete removal may stimulate the growth of the neoplasm. Treatment therefore is narrowed to deep X-ray therapy and the prognosis is unfavorable. (Roentgenographs.)

Ray K. Daily.

Birch-Hirschfeld. **Clinical course and therapy of orbital phlegmons.** Awerbach jubilee volume, 1935, p. 84.

A report of a case of thrombophlebitis of the orbit with multiple purulent foci in the retrobulbar tissues. Exploration of the orbit through wide incisions at the inner upper and outer lower angles of the orbit evacuated but little pus, and had little influence on the exophthalmos and ocular motility. Suction applied to the wound daily evacuated a bloody pus and under this treatment the patient recovered, although the vision of the eye was lost from thrombosis of the central retinal vein. The author condemns exploratory puncture of the orbit because it may carry infection to uninvolved tissue, may wound important structures, and does not provide sufficient drainage. Incision through the orbital border and elevation of the periosteum permits a search for the origin of the phlegmon and provides better drainage.

Ray K. Daily.

Cohen, Martin. **Inflammatory exophthalmos in catarrhal disorders of the**

**accessory sinuses.** Arch. of Ophth., 1936, v. 15, March, pp. 457-476; also, Trans. Sec. on Ophth., Amer. Med. Assoc., 1935, 86th annual session, p. 209.

The author reports four cases. In the first there was a reverse infection starting as a furunculosis of the ala nasi and spreading to the orbit, accessory sinuses, and cavernous sinuses and resulting in death. The second was of nonsuppurative cellulitis due to subacute ethmoiditis, and subsided under local treatment to the eyes and nose. The third and fourth cases were of a chronic inflammatory nature and were relieved through a Krönlein operation. (Photographs, discussion.)

J. Hewitt Judd.

Feldman, A. I., and Wolfson, S. I. **Orbital complications in acute infections of the superior maxilla and accessory nasal sinuses in children.** Awerbach jubilee volume, 1935, p. 546.

At the otolaryngological department of the Second Moscow Eye Clinic, orbital complications in infants are found to be caused most frequently by osteomyelitis of the superior maxilla. As the sinuses develop, ethmoiditis following acute infectious diseases becomes a prominent etiologic factor. The author discusses in detail the surgical treatment of the nasal infections.

Ray K. Daily.

Fradkin, M. I., Rossel, S. I. and Antushevich, E. K. **The effect of physico-chemical factors on the hemato-ophthalmic barrier.** Awerbach jubilee volume, 1935, p. 556.

The objective of this experimental study on rabbits was to determine the effect of a change in the osmotic pressure of the blood on ocular permeability. The osmotic pressure, measured on the Berkman cryoscope, was raised by the injections of 10 c.c. of ten percent saline per kilogram of body weight. The indicators of permeability were  $\text{Na}_2\text{FeCy}_6$  and trypan blue, which under normal conditions do not pass into the aqueous humor. In the author's experiments these substances permeated the aqueous humor after the osmotic pressure was raised. The author interprets



these findings as additional evidence of the presence of a complex hemato-ophthalmic barrier, functioning on a biologic basis and inactivated by the raised osmotic pressure.

Ray K. Daily.

Iribarren, L. A. **A case of monolateral anophthalmos.** Arch. de Oft. de Buenos Aires, 1936, v. 11, April, p. 205.

In the case reported the palpebral fissure was only 8 mm. wide, no rudimentary globe was palpable, and no colobomatous cyst demonstrable. Occlusion of the fetal cleft is regarded as the mechanism.

M. Davidson.

Kluever, H. C., and O'Brien, C. S. **Panophthalmitis due to Clostridium welchii.** Arch. of Ophth., 1936, v. 15, June, pp. 1088-1093.

In a man aged 37 years, fulminating panophthalmitis with gas in the anterior chamber developed within a few hours after a penetrating injury of the eye. A clinical diagnosis of infection with gas bacilli was made and the eye was eviscerated. Polyvalent gas gangrene antitoxin was administered and the patient recovered. The organism was isolated in pure culture from the anterior chamber. The literature is reviewed.

J. Hewitt Judd.

Kolen, A. A. **Methods of plastic surgery of the orbit and the lids.** Awerbach jubilee volume, 1935, p. 209.

A comprehensive and detailed discussion of the various phases of the subject. The conclusions are that plastic surgery has reached a development which justifies its wide application in the practice of all ophthalmologists. The material for grafts and the type of graft have to be decided for each individual case, and no one method can be used universally. Free cutaneous transplants should be of the same size as the defect and sutured with slight tension. The type of dressing is not so important as daily inspection at dressings. The author finds horse-hair the best suture material. Postoperative physiotherapy enhances the result considerably. Plastic restoration of the conjunctival sac has been replaced in large measure, in the writer's practice, by

forced stretching of the conjunctival sac, based on the elasticity of the conjunctiva. The author's method consists in forcibly introducing into the conjunctival sac the largest possible prothesis and holding it there with lid sutures. In four to seven days the conjunctival sac is found sufficiently and permanently stretched and adapted in form to the sutured lids. In plastic restoration of the conjunctival sac, the author, instead of using plastic compound, lines the cavity with vaselin-saturated gauze which can be left in place for days and packs this gauzelined cavity with gauze which can be changed as indicated. (Illustrations.)

Ray K. Daily.

Kraupa, E., and Mendl, K. **Intermittent exophthalmos.** Zeit. f. Augenh., 1936, v. 89, April, p. 40.

Intermittent exophthalmos has been recognized and reported only 95 times in the last 65 years. In Kraupa's 31-year-old patient the right eye had protruded upon stooping ever since the tenth year. With the occurrence of exophthalmos the lids would swell and the lid slit become narrowed. On the roentgenogram two phleboliths were shown which changed their position 0.5 cm. with protrusion of the eyeball. So few cases have come to operation that a clear classification on the basis of the anatomic cause is impossible. The protrusion depends on the state of filling of blood spaces such as varices and angiomas and may be combined with pulsation.

F. Herbert Haessler.

Krause, A. C. **Biochemistry of the eye.** Arch. of Ophth., 1936, v. 15, March, pp. 522-543.

The author reviews the literature and presents observations for each anatomic division of the eye. (Bibliography of 178 articles.)

J. Hewitt Judd.

Lamb, H. D. **Cyclopia in a new-born kitten.** Arch. of Ophth., 1936, v. 15, June, pp. 998-1003.

The kitten, which lived several hours after birth, had a central single eyeball 9 by 11 by 11 mm. There was no oral cavity or nasal process. The cerebral



hemispheres were absent, and only the posterior part of the brain stem and the cerebellum were present. The histologic findings are described and are illustrated by photomicrographs. Chief among these were coloboma of the choroid and rosettes in the retina. There was no doubling or reduplication of any part, and this, together with the lack of development of brain and face, supports the theory of Huschke that the ocular anlagen of the two sides are normally fused together for a brief period before separating into the two retinal rudiments.

J. Hewitt Judd.

Pokrovskii, A. I. **Tumors of the orbit.** Awerbach jubilee volume, 1935, p. 337.

A discussion of the pathology, prognosis, and therapy of neurinoma, chondro-osteosarcoma, and encapsulated fibrosarcoma of the orbit, with detailed case reports of each type of tumor. Neurinomas are benign tumors but the damage done by their pressure in the orbit calls for immediate surgical removal. A chondrosarcoma originating from one of the right periorbital sinuses grew slowly for three years, and then within a few months assumed a malignant character with intoxication and exhaustion of the patient. During attempted exenteration of the orbit, excessive hemorrhage prevented complete extirpation of the growth and exact determination of the origin of the tumor. Such a clinical course demonstrates the necessity for early operation. The fibrosarcoma originated from the membranes of the optic nerve, and caused pressure atrophy of the nerve. The unusual feature of this case was the growth of the tumor forward, thinning the sclera, instead of backward into the orbit. In addition to surgical removal these tumors should have radiotherapy as a prophylactic measure against recurrence. (Illustration.)

Ray K. Daily.

Rosenstein, A. **Microphthalmos and injury to the germ cell.** Wien. med. Woch., 1936, no. 9, Feb. 27, p. 238, and no. 10, March 7, p. 267.

In these two articles the author reviews the literature of the etiology of microphthalmos and presents three

cases to substantiate her view that injury to the germ cell is a factor to be considered. In all three cases the parents were alcohol imbibers to a marked degree.

Theodore M. Shapira.

Savelev, S. V. **Vascular tumors of the orbit.** Awerbach jubilee volume, 1935, p. 406.

A detailed report of two cases of hemorrhagic cysts of the orbit. Both were of traumatic origin, produced progressive exophthalmos with corneal complications, and were successfully removed surgically. (Illustrations.)

Ray K. Daily.

Slonimski, S. L. **Sanitary hygienic character of the manufacture of ocular prothesis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 3, p. 454.

A description of the various processes used in the manufacture of artificial eyes.

Ray K. Daily.

Weskamp, C., and Alvarez, C. **Pure exophthalmos originating from Basedow's disease.** Ann. d'Ocul., 1936, v. 173, April, pp. 273-285.

In a series of cases the pulse rate and basal metabolic rate were normal and there was no evidence of goiter. There was, however, nervousness and slight tremor. Apparently these cases represent a fully developed form of Basedow's disease in which exophthalmos is the only definite symptom.

John C. Long.

## 14

### EYELIDS AND LACRIMAL APPARATUS

Arruga, H. **Dacryostomy.** Awerbach jubilee volume, 1935, p. 13.

A detailed description of an external dacryocystorhinostomy in which the osseous partition is removed with a motor-driven trephine and burrs. Of eight hundred operations 95 percent gave satisfactory results. (Illustrations.)

Ray K. Daily.

Baratta, Orazio. **Dacryocystitis from malformations and traumatic bone deformities.** Riv. Oto-Neuro-Of., 1935, v. 12, Nov.-Dec., pp. 753-781.

Among 150 patients affected by dacryocystitis one had positive Wassermann, one was affected by tuberculosis, and seven showed a hereditary factor. In 18.77 percent of the cases atrophic, hypertrophic, and ozenatous rhinitis was present, while by roentgenography 6 percent showed opacification of the ethmoidal cells, 9.3 percent opacification of the frontal, 27.3 percent opacification of the antrum, and 2.67 percent pansinusitis. Opacification of the antrum was found in cases of phlegmon of the sac which started with symptoms of peridacryocystitis. The writer gives the clinical history of dacryocystitis connected with morphologic changes of the nose and lip and of nasal cavities, or anomalous position of the tendon, lacrimal bone, nasal canal, septum, and turbinates. (Bibliography, 16 figures.)

M. Lombardo.

Basterra, J. **Remarks about the extranasal dacryocystorhinostomy.** Arch. de Oct. Hisp-Amer., 1936, v. 36, April, pp. 208-216.

After a brief historical outline, the author makes some remarks about trephining with dental drills and suturing an anterior flap of the sac to a corresponding flap of the nasal mucosa. For both of these technical details he claims priority. He mentions X-ray of the lacrimal passages after injecting barium sulphate, lipiodol, or iodipin as a valuable diagnostic procedure.

R. Castroviejo.

Bokstein, F. S. **Prevention and treatment of recurrences after Toti's operation.** Averbach jubilee volume, 1935, p. 91.

From 75 endonasal reoperations after Toti's operation the author is convinced that failures after Toti's operation are due to insufficient size of the nasal opening, its improper position, or inadequate postoperative intranasal treatment permitting formation of granulations in the opening. To avoid these errors the ophthalmologist should, in the author's opinion, have some knowledge of rhinoscopy and the anatomy of the outer nasal wall. For this purpose he recommends three months service in a

rhinologic clinic for those who intend to treat disease of the lacrimal canal.

Ray K. Daily.

Galewska, S., and Litauer, R. **Operative treatment of entropion and trichiasis by Maher's method.** Rev. Internat. du Trachome, 1936, v. 13, Jan., pp. 41-47.

The author used Maher's operation for repair of entropion and trichiasis 249 times between 1921 and 1931. It was successful in nearly all cases and the author feels it should be more generally utilized. The simple technique consists of placing a mucous membrane graft on the conjunctival surface of the lid after deep incision through the tarsus to allow straightening of the deformed lid. (4 illustrations.)

P. J. Leinfelder.

Grósz, Stephan. **Lupus erythematosus palpebrae.** Klin. M. f. Augenh., 1936, v. 96, May, p. 636.

A man of 42 years showed an isolated lupus erythematosus of the left lower lid, manifested by infiltration and redness, with scales and an atrophic white stripe, thickening of the conjunctiva, and a defective row of lashes. It had developed eighteen months after injury by a leaf at the inner canthus. A man of 33 years presented circumscribed sensitive infiltrations of the right upper and left lower lids, as early stages of lupus erythematosus of the face. Treatment included local applications of salicylic acid and ichthyol. (Illustrations.)

C. Zimmermann.

Hall, A. J. **Some observations on the acts of closing and opening the eyes.** Brit. Jour. Ophth., 1936, v. 20, May, p. 257.

Blinking may be of reflex origin or may occur without the intervention of any obvious stimulus. A very exhaustive study of the position and movements of the eyes in sleep in several hundred adults, youths, and infants is set forth in tables. During sleep the eyeballs by slow smooth movement assume different positions, upward, laterally, or downward. The behavior of the eyeballs during and after closure of the lids was examined in 1250 normal per-

sons. It was found that in eighty percent the eyes were moved upward and in eleven percent there was no movement upward. Moving picture illustrations demonstrate this phenomenon. Winking is discussed.

D. F. Harbridge.

Ivanova, E. M. **1200 cases of external dacryocystorhinostomy.** Awerbach jubilee volume, 1935, p. 160.

A review of the literature and an analysis of 1,200 operations performed by the staff of the Helmholtz hospital at Moscow during ten years. The conclusions are that the operation is indicated in all cases of dacryocystitis, and is in every respect as effective as complete extirpation of the sac. It gives excellent results in recurrences following extirpations of the sac. It is harmless, and presents no technical difficulties. Its chief advantage is in the fact that it restores normal function. Failures are due not to the method but to technical inadequacy.

Ray K. Daily.

Kirshman, I. S. **Technique of anastomosing the lacrimal sac with the nose.** Awerbach jubilee volume, 1935, p. 203.

A detailed description of the instrumentarium used in the Dupuy-Dutemps operation. The author has modified the Arruga electric trephines and burrs and uses a Shiraev knot-tier to tie the deep sutures in the mucous membrane. (Illustrations.)

Ray K. Daily.

Lijo Pavia, J. **A new oculopalpebral syndrome. Chronic pseudomembranous tumoral keratoconjunctivitis or keratoconjunctivitis from wood.** Arch. de Oft. de Buenos Aires, 1936, v. 11, April, p. 231; also Rev. Oto-Neuro-Oft., 1936, v. 11, April, p. 89.

Aside from the question of priority, Lijo Pavia having first described the condition in 1924, to be followed by Morax, Borel, and Castroviejo, the successful treatment of this case with antimeningococcic vaccine points to the etiology.

M. Davidson.

McLeod, J., and Lux, P. **Cicatricial ectropion as a result of mucocele of the frontal sinus.** Arch. of Ophth., 1936, v. 15, June, pp. 994-997.

A patient aged 56 years had first no-

ticed a large painless swelling in the right upper lid twelve years previously. After incision of a mucocele of the frontal sinus a fistula resulted, producing eversion of the right upper lid. Plastic repair gave an excellent result. (Photographs.)

J. Hewitt Judd.

Rodin, F. H. **Ptoxis.** Amer. Jour. Ophth., 1936, v. 19, July, pp. 597-599.

Rollet, J. **The precorneal layer of fluid.** Arch. d'Ophth., 1936, v. 53, Jan., p. 5; Feb., p. 111; April, p. 255.

The thin film of fluid which covers the cornea is considered as the sixth layer and is indispensable for corneal nutrition and visual function. The lids are accessory to this fluid, not vice versa, since their function is to preserve, regulate and distribute equally the fluid. The fluid is made up of lacrimal and other glandular products and as such is highly complex. Disturbance of its formation, chemical makeup, and distribution alters its physiologic action, and thereby disturbs ocular function.

Derrick Vail.

Rollin, J. **The lid slit of the Negro.** Zeit. f. Augenhe., 1936, v. 89, April, p. 95.

Some anthropologists believe that there are three characteristic positions of the lid slit; namely, the European which is horizontal, the Mongoloid which slants up and out, and the Negroid which slants down and out. Observations on countless negroes have convinced the author that the so-called Negroid lid slit is not characteristic of the black race, and that in this race the so-called Mongoloid type of lid slit is found more frequently than in Europeans.

F. Herbert Haessler.

Spratt, C. N. **The use of Callahan tubes in the treatment of chronic dacryocystitis.** Amer. Jour. Ophth., 1936, v. 19, July, pp. 601-603.

Tschekina, A. H. **The Blascovicz operation for ptoxis.** Sovetskii Viestnik Ophth., 1936, v. 8, pt. 4, p. 551.

A description of the operation and brief reports of six cases, with five satisfactory results. (Illustrations.)

Ray K. Daily.



## 15 TUMORS

Anthonsen, H. **Plasmocytoma of the eyelid.** *Det oftalmologiske Selskab i København's Forhandlinger*, 1934-1935, pp. 65-66. In *Hospitalstidende*, 1935, Dec. 17.

A man of sixty years came with a smooth, bluish-red sharply defined tumor of the left upper eyelid, extending the whole length of the lid. The surface showed a coarse network of veins and the consistence while firm was not hard. Biopsy revealed a plasmocytoma. This tumor, which occurs quite commonly in the nose and nasopharynx, is very rare around the eyes. It is very sensitive to roentgen rays and in this instance it disappeared rapidly after exposure to them. D. L. Tilderquist.

Byers, W. G. M., and MacMillan, J. A. **The treatment of sarcoma of the uveal tract.** *Trans. Amer. Ophth. Soc.*, 1935, v. 33, pp. 184-201. (See *Amer. Jour. Ophth.*, 1936, v. 19, April, p. 369.)

Coston, T. O. **Primary tumor of the optic nerve, with report of a case.** *Arch. of Ophth.*, 1936, v. 15, April, pp. 696-702.

Primary tumors of the optic nerve are either intraneural tumors, the gliomas, or tumors of the nerve sheath, the meningiomas and fibromas. Characteristics of these tumors are discussed. The case reported is of a woman aged 48 years, in whom an extension to the disc was recognized ophthalmoscopically and was subsequently proved by histologic examination. The article is illustrated by a fundus photograph and photomicrographs. J. Hewitt Judd.

Friedman, M., and Engel, J. **Epithelioma of the skin of the bridge of the nose.** *Jour. Amer. Med. Assoc.*, 1936, v. 106, May 30, p. 1879.

The eye had completely degenerated from pressure necrosis produced by the overlying tumor, an extensive basal epithelioma originating at the inner canthus of the eye and the nasal bridge. Treatment of the lesion with massive dosage of low voltage roentgen rays (six weekly treatments of 4,000 roent-

gens) resulted in complete healing. (5 figures.) George H. Stine.

Hay, P. J. **Carcinoma of choroid secondary to carcinoma of the lung.** *Trans. Ophth. Soc. United Kingdom*, 1935, v. 55, p. 564.

This is the pathologic report of an eye removed for a tumor which was diagnosed as carcinoma penetrating the membrane of Bruch, and secondary to involvement of the right lower lobe of the lung. The patient died two months later with hemoptysis and consolidation of the right lower lobe.

Beulah Cushman.

Kiehle, F. A. **Tumor of the optic nerve.** *Arch. of Ophth.*, 1936, v. 15, April, pp. 686-691. (See *Amer. Jour. Ophth.*, 1936, v. 19, Jan., p. 82.)

Kiep, W. H. **Carcinoma of choroid secondary to carcinoma of breast and of rectum.** *Trans. Ophth. Soc. United Kingdom*, 1935, v. 55, p. 566.

Two cases are reported, the first in a woman of 41 years who had had a scirrhus tumor of the left breast removed 2½ years previously to a blurring of her right vision. The diagnosis of a metastatic choroidal tumor was made, and the pathologic examination corroborated the diagnosis. The patient died five months later with metastasis in the lower dorsal spine and stomach. The second patient was a man of 71 years who had had carcinoma of the bowel for two years, then complained of blurred left vision. A tumor mass found above the macular area was diagnosed as metastatic, but the eye was not removed. Beulah Cushman.

Klien, B. A. **The ciliary margin of the dilator muscle of the pupil . . . melanomas of the iris. . .** *Arch. of Ophth.*, 1936, v. 15, June, pp. 985-993.

The histology of the dilator muscle is discussed, together with the various tumors arising in this region. A case of malignant melanoma of the iris in a man aged 64 years is reported and is illustrated by photomicrographs. Attention is drawn to the similarity of parts of the tumor to the benign types



of melanomas and the apparent connection with the dilator muscle.

J. Hewitt Judd.

Merkulov, I. I. **Ocular changes in neurofibromatosis.** Awerbach jubilee volume, 1935, p. 280.

Following a review of the literature the author reports two cases. One, in a ten-year old girl who had neurofibromatous nodules in the lids and scalp, was complicated with hydrophthalmos of the right eye and hypertrophy of the right side of the head. The second case, in a girl sixteen years old, is very unusual in that biomicroscopy demonstrated a number of nodules throughout both irises. (Illustrations.)

Ray K. Daily.

Pallares Lluesma, Juan. **Contribution to the study of plasmoma of the conjunctiva.** Arch. de Oft. Hisp-Amer., 1936, v. 36, Feb., pp. 61-77.

The author reports four cases of plasmoma of the conjunctiva in patients who had been affected with trachoma. Tissue was excised from the conjunctival growth, and microscopic study revealed it to be composed of plasma cells, connective tissue, and some hyaline substance. Treatment was carried out by excision. Scarification of the granules was followed by applications of cyanide of mercury in from 1/500 to 1/1000 solution and finally instillation of a solution of copper sulphate. Symptomatology, etiology, pathogenesis, pathologic anatomy, and treatment of the condition are briefly discussed. (3 illustrations, bibliography.)

R. Castroviejo.

Pfeiffer, R. L. **Roentgenographic diagnosis of retinoblastoma.** Arch. of Ophth., 1936, v. 15, May, pp. 811-821.

In the calcareous degeneration of retinoblastoma, roentgenograms show the sandy bodies in the tumor as characteristic mottled or granular shadows. In fifteen of twenty laboratory specimens, calcium shadows were shown on the roentgenograms. In eight of ten cases proved histologically, shadows of calcium were shown in the orbit before enucleation. In four cases of pseudo-

glioma no calcium was shown by roentgenographic examination before or after enucleation. Pfeiffer concludes that in 75 percent of the cases of retinoblastoma there is sufficient calcareous degeneration to be recognized roentgenographically and that the granular and irregular shadow is pathognomonic of tumor when found in children.

J. Hewitt Judd.

Pokrovskii, A. I. **Neoplasms of the orbit.** Awerbach jubilee volume, 1935, p. 352.

The author discusses the vascular tumors of the orbit and reports in detail cases of simple angioma, cavernous angioma, and angiofibroma, as well as cases of orbital hemorrhage simulating neoplasm. The angiomas develop from embryonal rests of the vascular system, and trauma is an exciting factor in stimulation of the growth. Histologic study of the case of cavernous angioma did not support the view that it was a second stage of simple angioma caused by varicose dilatation. While these tumors are benign, the possibility of their becoming endotheliomas, and of their causing pressure atrophy of the optic nerve, indicates early removal through an incision at the orbital border. A hematomata in the walls and lumen of an ectatic lacrimal sac simulated a neoplasm in the lower inner angle of the orbit. Traumatism was not a factor in this case, and the author attributes the hemorrhage to vascular changes in the bloodvessels in chronic dacryocystitis. To illustrate the importance of not overlooking hemophilia the author reports a case of massive retrobulbar hemorrhage in a hemophiliac. Prior to discovery of the blood abnormality, one eye was enucleated with the diagnosis of orbital tumor and the other was lost from a panophthalmitis secondary to corneal ulcer. (Illustrations.)

Ray K. Daily.

Renard, G., Huguenin R., and Cas-siau, P. **Study of a case of dermo-epithelioma of Parinaud.** Arch. d'Ophth., 1936, v. 53, March, p. 197.

In 1884 Parinaud described a tumor "reddish-yellow color, semitranslucent

appearance, somewhat lobulated, situated at the external border of the cornea, movable on the sclera, and encountered in young subjects." The authors describe such a case occurring in a patient 67 years old. The tumor was situated in the region of the caruncle and was pigmented and cystic. A complete histologic description of the growth is given. (Illustrations, bibliography.)  
Derrick Vail.

Soudakoff, P. S. **An advanced stage of diktyoma. Report of a case.** Arch. of Ophth., 1936, v. 15, April, pp. 680-685.

Malignant tumors of the ciliary epithelium are either malignant epithelioma or diktyoma, a tumor resembling the undifferentiated embryonic retina. This is the ninth case of diktyoma in the literature. In the left eye of a Chinese male aged 28 years there was extensive destruction of the ocular structures by tumor cells growing chiefly in the form of bands, consisting of one or several layers of cells. In places tumor cells were arranged in groups. This is the most advanced stage of diktyoma retinae so far reported. (Photomicrographs.)  
J. Hewitt Judd.

Trovati, E. **Clinical and pathologic contribution to vascular neoplasias of the orbit.** Ann. di Ottal., 1936, v. 64, Feb., p. 91.

The author reports clinically and histologically two cases of orbital angioma. The first took origin from the deeper structures of the upper lid, extended secondarily into the orbit, and then into the conjunctiva of the upper inner fornix. The second originated in the orbital vessels. The first, poorly delimited, corresponded to the type angioma racemosum. The second, completely circumscribed, had the characteristics of ordinary cavernous angioma. (Radiographic plate and figures, bibliography.)  
Park Lewis.

**its prevention.** Awerbach jubilee volume, 1935, p. 75.

A comparative tabulation of ocular traumatism for 1932 and 1933. The measures responsible for the diminishing number of ocular injuries are sanitation propaganda, protective spectacles, machine guards, and restriction of the use of the lathe to skilled workers. Under the educational measures are listed discussions with the workers at the machines during work, group visits of workers to the hospitals and conversations with the injured, visits of ophthalmologists of note to the factory, articles in the factory publications, and posters at the machines.

Ray K. Daily.

Berezinskaia, D. I. **Acid and alkali burns of the eye.** Sovetskii Viestnik Ophth., 1936, v. 8, pt. 3, p. 319.

A detailed report of an experimental study on rabbits. The conclusions are that five percent caustic soda penetrates within five minutes through the cornea into the anterior chamber; under the same experimental set-up the penetration of fifty percent sulphuric acid was not demonstrable. The pathologic picture of acid and alkali burns differs, that from alkali being more severe. The difference is apparent within the first hours after the injury, and is due to differing corneal penetrability to acids and alkalies. In alkali burns the process is diffuse, and involves the uvea and all parts of the cornea with the exception of Descemet's membrane. Descemet's membrane has a high resistance to acids and alkalies. In acid burns the pathologic process is circumscribed and superficial and deep penetration is due to secondary infections. In hydrochloric acid burns the corneal tissue becomes homogeneous and there are apt to be superficial scabs. Acid burns may be complicated by cataract. (Photomicrographs.) Ray K. Daily.

**Eliminating fireworks accidents.** Discussion by various speakers. Sight-Saving Review, v. 5, March 1935, pp. 37-50.

In the last thirty years 4,290 Americans have been killed in fireworks accidents and 96,000 have been injured.

## 16

### INJURIES

Berezinskaia, Wolfson, Gornetz, Itzikson, and Epstein. **Ocular traumatism at the "Manometr" Industrial plant and**

Cities having model fireworks ordinances have as many accidents as those having no regulation of the sale of fireworks, because it is impossible to control the sale of fireworks in small shops and in roadside stands. The only means of effective control lies in restricting sale at the factory and a resolution is presented restricting the sale of fireworks to (1) Army and Navy departments of the United States government; (2) railroads, steamship and aviation lines, and other industrial or commercial concerns requiring pyrotechnics for the normal conduct of their business; (3) federal, state, municipal, or county governments and such clubs or associations as can guarantee that fireworks will be discharged on their premises by pyrotechnic experts.

Edna M. Reynolds.

Espildora Luque, C. **Meningeal reaction in sympathetic ophthalmia and penetrating ocular wounds.** Arch. de Oft. Hisp.-Amer., 1936, v. 36, Feb., p. 90. (See Section 7, Uveal tract, sympathetic disease and aqueous humor.)

Farberov, B. **Bone-free roentgenography of the anterior ocular segment.** Averbach jubilee volume, 1935, p. 541.

Having demonstrated foreign bodies with this method in nineteen cases in which the usual X-ray photographs were negative, the author concludes that the method should be used in all cases in which roentgenography is negative and the history of the case points to an intraocular foreign body.

Ray K. Daily.

Keller, J. M. **Retinal periphlebitis in septic endophthalmitis and its ophthalmoscopic picture.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 520-533. (See Section 10, Retina and Vitreous.)

Korenevich, I. **Electromagnet operation.** Sovetskii Viestnik Ophth., 1936, v. 8, pt. 4, p. 597.

An exhaustive study of ninety foreign-body magnet extractions. The study shows 8.1 percent of loss of function in diascleral extraction of foreign bodies from the posterior ocular segment and 25 percent loss in extractions

through the anterior chamber. The least favorable functional results were obtained in the extraction of the foreign body through the original point of entry. Extractions within the first few days after the injury resulted in 16.7 percent functional loss, while in delayed extractions the vision was lost in only 4.8 percent of the eyes. Hospitalization was longer in extractions by the anterior than by the posterior route.

Ray K. Daily.

MacDonald, A. E. **A practical method to test the strength of ophthalmic magnets.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 403-404.

A 1/16-inch steel ball bearing is attached to a 2 or 3-inch silkworm-gut bristle with celloidin. The free end of the bristle is then inserted into an ordinary rifle cartridge filled with lead weighing about 50 gm. To test the strength of the magnet, weights are added until contact is broken. For measuring weak pulls, when the object is separated from the magnet, wooden cases are used which are constructed to receive a mercury or sand drip.

C. Allen Dickey.

Renedo, M. **War gases in ophthalmology.** Arch. de Oft. Hisp.-Amer. 1936, v. 36, April, pp. 179-208.

The author enumerates the different gases used in warfare since ancient times. Modern war gases are classified as lacrimogenous, sneezing, asphyxiating, vesicating, toxic for the nervous system, and toxic for the blood. Symptoms are briefly described, with special reference to those produced upon the visual apparatus. These vary from slight irritation of the conjunctiva to severe corneal ulcers, with marked photophobia and blepharospasm. Curative treatment varies according to the nature of the gas causing the condition. As a rule frequent irrigation with a mild antiseptic is the treatment of choice.

R. Castroviejo.

Samuels, Bernard. **Chronic postoperative or posttraumatic retinitis (retinitis serosa).** Amer. Jour. Ophth., 1936, v. 19, June, pp. 493-503; also Trans. Amer. Ophth. Soc., 1935, v. 33, p. 291.



Thorpe, H. E. **A new forceps for removal of lead shot from the vitreous.** Trans. Sec. on Ophth., Amer. Med. Assoc., 1935, 86th annual session, p. 336. (See Amer. Jour. Ophth., 1936, v. 19, July, p. 637.)

Vinogorov, D. P., and Kopit, R. Z. **Alkali burns of the eyeball.** Sovetskii Viestnik Ophth., 1936, v. 8, pt. 3, p. 333.

A detailed report of experimental studies on guinea pigs. The conclusions are that five-percent solutions cause necrosis of the corneal epithelium and endothelium, and may produce Greef cysts in the ciliary body as well as retinal edema. Greef cysts are not found in burns with concentrated alkali, because of rapid destruction of the ciliary body. Weak alkali solutions may cause subcapsular cataract. Strong solutions produce necrosis of the lids, conjunctiva, cornea, ciliary body, iris, and of the epithelium of the lens. Morgagnian spheres may be seen as consequences of deep changes in the vitreous. Descemet's membrane is the most resistant portion of the eyeball, being free from changes in burns with fifty percent solutions. (Photomicrographs.)

Ray K. Daily.

## 17

### SYSTEMIC DISEASES AND PARASITES

Archangelskii, P. F. **Spotted typhus and the eye.** Sovetskii Viestnik Ophth., 1936, v. 8, pt. 4, p. 509.

A critical analysis of the literature on the subject. The author affirms his conclusions published in 1920 that involvement of the optic nerve is characteristic of spotted typhus, just as involvement of the anterior segment of the eyeball is typical of relapsing typhus.

Ray K. Daily.

Bedell, A. J. **A case of tumor of the antrum involving the eye.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 404-405.

A tumor between the upper incisor teeth developed in a patient aged 47 years. Following removal, there was rapid recurrence with extension into both antrums and the hard palate. In spite of repeated removal and massive

doses of radium the growth enlarged until practically all of the face was involved. Acute nephritis followed intensive arsenic therapy but the Wassermann reaction remained positive. The tumor was diagnosed as chondrosarcoma and later osteogenic sarcoma.

C. Allen Dickey.

Biozzi, Giuseppe. **Ocular manifestations of the sphenopalatine ganglion syndrome.** Riv. Oto-Neuro-Oft., 1935, v. 12, Nov.-Dec., pp. 730-737.

A man of 36 years had been affected for a month by intense redness and catarrhal secretion of the left eye, photophobia, pin-prick sensation, and violent coryza with obstruction of the corresponding nasal cavity and abundant watery secretion. Conjunctival injection was more marked temporally, where small nodules formed by blood vessels were visible with the slit-lamp, and minute epithelial defects were shown by fluorescein. A woman of 32 years had been suffering for a few years with recurrent bilateral attacks of palpebral edema, redness of the conjunctiva, photophobia and lacrimation more marked at night, violent pain in the globe and the left side of the head, obstruction of the right nasal fossa, and abundant secretion of clear aqueous fluid. The slit-lamp showed small opacities and superficial vascularization of the cornea. The writer thinks that corneal trophic disturbances arise through a nerve filament which connects the sphenopalatine with the ciliary ganglion. This filament is not constant, which fact explains why the cornea does not in all cases participate in the sphenopalatine syndrome. (Bibliography.)

M. Lombardo.

Buschke, Wilhelm. **Vitamins in ophthalmology.** Zeit. f. Vitaminforschung, 1936, v. 5, Jan., pp. 37-68. (Reprint.)

This is a general review of the literature of the subject for recent years to the beginning of 1936, the effect of each vitamin upon the individual structures of the eye being dealt with.

Dalsgaard-Nielson, Esther. **Basal radiculomeningitis complicating oph-**



**thalmic herpes zoster.** Det oftalmologiske Selskab i København's Forhandlinger, 1934-1935, pp. 56-58. In Hospitalstidende, 1935, Dec. 17.

A woman of 76 years suffered from typical herpes zoster, of sudden onset, on the left side of the head and involving the left eye. Two weeks later, in rapid succession, the following condition developed in the left eye: loss of vision, glaucoma with iridocyclitis, paralysis of all the eye muscles, and exophthalmos. Aseptic thrombosis of the cavernous sinus, infection of the nasal sinuses, aneurism at the base of the brain, tumor of the brain, and localized meningitis were all considered in making a differential diagnosis. All the evidence was in favor of the last. The infection of the Gasserian ganglion which was assumed to have caused the herpes zoster could have spread to the adjoining meninges and cranial nerves and have given rise to all the symptoms. Six weeks after onset marked improvement had already taken place.

D. L. Tilderquist.

Jess, A. **Relationship between the spring and eye diseases.** Deut. med. Woch., 1936, no. 16, April 17, p. 627.

Jess mentions these diseases as being commonest in the spring: spring catarrh, acute lid edema and conjunctival chemosis due to spring flowers, rosacea conjunctivitis and keratitis, scrofulous keratitis, keratomalacia, night blindness, and glaucoma.

Theodore M. Shapira.

Katznelson, A. B. **Relation between scrofulous and tuberculous disease of the eye.** Awerbach jubilee volume, 1935, p. 196.

A review of the literature and a study of the clinical history, with records of 37 cases of tuberculosis of the anterior segment and 37 cases of tuberculosis of the posterior segment. The study shows that 91 percent of patients with tuberculosis of the anterior segment and 10 percent with tuberculosis of the posterior segment had phlyctenular conjunctivitis in childhood. The author therefore urges that children with scrofulous eye diseases should be placed

under observation of the children's health department, and should have all types of social and medical assistance.

Ray K. Daily.

Kazas, I. I. **Interruption of pregnancy and the eye.** Awerbach jubilee volume, 1935, p. 177.

A comprehensive description of the toxemias of pregnancy and the associated changes in metabolism. The author advocates immediate interruption of pregnancy for diseases of the light perception apparatus, for ulcerative keratitis, and for increased vitreous opacities in myopia. Optic neuritis and ulcerative keratitis in nursing mothers call for weaning of the child. High myopia is affected adversely by pregnancy, and high myopes should be advised not to bear children.

Ray K. Daily.

Melkin, B. M. **Blood transfusion in ophthalmology.** Awerbach jubilee volume, 1935, p. 253.

Reference is made to Archangelskii's use of blood transfusions for vitreous opacities and the research possibilities of blood typing are pointed out. A review of the literature and tabulated findings of blood typing in 358 persons with various ocular diseases point to some interesting possibilities in this field. The data show the preponderance of group O in retinitis pigmentosa and of group A in optic atrophy. Senile cataracts are represented in all blood types, but the severe postoperative infections fall in type A. The maximum number of cases of inflammatory glaucoma is seen in type A and the minimum in type O. The maximum number of cases of simple glaucoma is in type O and the minimum in type B. Absolute glaucoma is seen most frequently in types A and B. The author urges blood typing on a large scale, in the hope of finding the blood type related to constitutional predispositions to disease.

Ray K. Daily.

Sergievsckii, I. I. **Tuberculosis and the eye.** Awerbach jubilee volume, 1935, p. 422.

A discussion of the action of tuberculin and a detailed description of the

Vienna method of treatment with tebe-protein. The author urges as diagnostic measures a general examination, roentgenography of the chest, tuberculin test, culture of the blood for tubercle bacilli, and slitlamp examination. In differential diagnosis syphilis and focal infection have to be eliminated. Because of the excellent general condition of patients with ocular tuberculosis they respond well to tuberculin therapy, which does not develop permanent immunity but saves many eyes which would otherwise be enucleated. An eye blind from a tuberculous lesion should be enucleated to protect the other eye from sympathetic ophthalmia. The diagnostic dose of tuberculin should avoid a pronounced focal reaction. The diagnostic dose which causes a suspicion of focal reaction should be the initial therapeutic dose. Nonspecific parenteral protein therapy and heavy metals act well in conjunction with tuberculin.

Ray K. Daily.

Spangol, V. **Removal of the larva of a fly from the anterior chamber of a boy of eleven years.** Klin. M. f. Augenh., 1936, v. 36, April, p. 494.

A boy of eleven years, son of a cowherd whom he assisted, noted for two months impairment of vision in his left eye without pain. Two weeks before admission he complained of severe pain in the eye. In the fold of the upper lid were two small cicatricial depressions, corresponding to a small scar in the upper fornix. The conjunctiva was injected, the cornea somewhat dull, the iris hyperemic and cloudy, the pupil dilated and without reaction. In the lower angle of the anterior chamber was a wormlike yellowish green object lying on the posterior surface of the cornea. Extracted, it proved to be a living larva of a fly of the species of *Wohlfartia magnifica*, which probably had entered the vitreous through the sclera. The severe pain which the patient felt two weeks before admission likely occurred when the larva penetrated the root of the iris. The affection ended with phthisis bulbi. (Illustrations.)

C. Zimmermann.

Spector, S. A. **Ocular diseases in lupus.** Averbach jubilee volume, 1935, p. 439.

A tabulation of the ocular complications of 662 patients at the Moscow lupus sanitarium. The table shows that 88 percent of the patients had ocular complications, mostly of the lids, cornea, and lacrimal sac. The ulcerative type of lupus invades the conjunctiva, particularly in the presence of ectropion, and a plastic operation for ectropion in this disease should be regarded as an important prophylactic measure. Phlyctenular keratitis is the most frequent corneal disease and runs a severe course. The primary involvement of the lacrimal sac is usually a peridacryocystitis extending from the nose. Women are affected more frequently than men because their lacrimal fossa is usually formed by the thin lacrimal bone. The lacrimal fossa of men, formed by the heavier bone of the nasal process of the superior maxilla, serves as a better barrier to infection. (Illustrations.)

Ray K. Daily.

Velhagen, K., Jr. **Isolated observations on endocrine disturbances and eye.** Klin. M. f. Augenh., 1936, v. 96, May, p. 577.

The following cases are reported: simultaneous occurrence of Graves's disease, acromegaly and glaucoma simplex in a woman of forty years; late retinitis pigmentosa in pernicious anemia of a man aged 61 years; acute keratoconus in different trophic disorders, doubtfully related to disturbances of thyroid or parathyroid glands, in a woman aged 38 years. Peculiar tapetoretinal degeneration (drusen) with hypophyseal tumor in a woman of 37 years. The endocrine problem is discussed.

C. Zimmermann.

## 18

### HYGIENE, SOCIOLOGY, EDUCATION, HISTORY

**Awerbach, Michail Josephovich.** Averbach volume, 1935, p. 7.

An appreciation of the ophthalmologist who is the founder and professor of the eye clinic of the Second Moscow

Medical Institute, chief ophthalmologist of the Helmholtz Hospital (the largest eye hospital in Europe, which has become under his initiative the Helmholtz Institute of Research and Clinical Ophthalmology), and director of the eye department of the Central Postgraduate Institute. He is also a founder of the Moscow Ophthalmological Society, and editor in chief of the *Sovietskii Viestnik Ophthalmologii*. Educated and bred under the Czarist régime, he took a sincere part in the new social structure of Russia and became one of the leaders in the conservation of public health. This volume, issued by his colleagues and coworkers in 1935, celebrates his forty years of medical activity.

Ray K. Daily.

Berens, C., Kerby, C. E., and McKay, E. C. **The causes of blindness in children; their relation to preventive ophthalmology.** Trans. Sec. on Ophth., 1935, 86th annual session, pp. 70-85. (See *Amer. Jour. Ophth.*, 1936, v. 19, March, p. 283.)

Berens, Conrad. **The talking book.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 405-407.

The American Foundation for the Blind devised the "talking book," which reproduces the ordinary book in about twelve phonographic records, each record lasting approximately forty minutes. It requires the talking-book machine, which was especially designed for it. These discs may be obtained free of charge on a library-loan basis from any library having a department for the blind.

C. Allen Dickey.

Berezinskaia, D. I. **Data on the relation between refraction, vocation, and vocational selection.** Awerbach jubilee volume, 1935, p. 66.

The author collected data on visual acuity with and without correction, vocation, and length of employment of 1,500 candidates for military service, 62 percent being emmetropic, 26.7 percent hypermetropic, and 11.1 percent myopic. Vocationally the men were divided into three groups: those employed in educational pursuits, and skilled and unskilled labor. The majority of the people in the three groups

were emmetropes. Hyperopia varied between 21 percent and 26.68 percent. But myopia was three times as frequent in those employed in educational pursuits as in the other two. The lowest percentage of refractive errors is found among skilled workers because they represent a selected group.

Ray K. Daily.

Birich, T. V., and Shapiro, P. H. **The condition of the visual apparatus among those subject to military service for the last three years in the Minsk district.** *Sovietskii Viestnik Ophth.*, 1936, v. 8, pt. 3, p. 449.

Examination of the young men called to service during the last three years shows a decided advance of health standards, due to the public health measures instituted during the last ten years. The incidence of trachoma as well as the number of men unfit for service is declining.

Ray K. Daily.

Contino, A. **Functional loss and industrial disability in eye injuries.** *Ann. di Ottal.*, 1936, v. 64, Feb., p. 73.

In Italy it is legally established that loss of one eye represents a loss of 35 percent and of the second eye of 65 percent. It has been generally agreed that the working capacity has not been impaired unless a loss greater than 2/10 has been sustained. The author considers methods determined by arithmetic and geometric progression and the estimated losses due to perimacular scotoma and other causes. By the new law going into effect on July 1, 1936, the minimum percentage of loss compensable will be raised from five to eleven percent, equivalent (according to the table used) to a loss of visual acuity (Snellen) of 0.4 to 0.5. The author thinks the minimum loss compensable should be reduced to eight percent.

Park Lewis.

**Contribution of statistics to the prevention of blindness.** *Sight-Saving Review*, 1935, v. 5, March, pp. 1-36.

A plan for standardization of statistics regarding the blind is outlined. Different degrees of blindness are specifically defined. A classification of the causes of blindness in twenty schools for the blind is given. The im-



portance of adequate ophthalmologic service for every institution and class for the blind is emphasized with a view to securing improvement of vision by treatment whenever possible and transferring to sight-saving classes children who have sufficient vision for education in the public schools.

Edna M. Reynolds.

Danielson, R. W., and Walker, C. E., Jr. **Optometric propaganda in recent encyclopedias.** *Amer. Jour. Ophth.*, 1936, v. 19, July, pp. 603-605.

Greeff, R. **An ophthalmologic museum.** *Klin. M. f. Augenh.*, 1936, v. 96, April, p. 511.

Greeff gives a description of the ophthalmologic museum recently opened at Berlin as part of the Medico-historical Collection. It contains spectacles and ophthalmologic instruments, 67 different ophthalmoscopes commencing with the first ophthalmoscope constructed and used by Helmholtz, historical pictures, and so on. The author solicits contributions of old instruments and appliances, addressed to the Empress Frederic House for Medical Progress, Berlin, N.W. 7, Robert-Koch Platz 7. (Illustrations.)

C. Zimmermann.

Lloyd, R. I. **Evolution of perimetry.** *Arch. of Ophth.*, 1936, v. 15, April, pp. 713-732.

A detailed historical review of the development of the methods employed in examination of the visual fields is presented. (Illustrations.)

J. Hewitt Judd.

Majewski, Kasimier. **The vision of Jean Matejko.** *Klinika Oczna*, 1936, v. 14, pt. 1, p. 66.

The style of the historical canvases of this Polish artist, characterized by careful reproduction of fine details of the background, is attributed by the author to the fact that the artist was highly myopic.

Ray K. Daily.

Martzin-Uroda, M. S. **The data of the Saratov Eye Clinic on the causes of blindness.** *Sovietskii Viestnik Opht.*, 1936, v. 8, pt. 3, p. 458.

A statistical study based on 43,494 patients seen at the Saratov eye clinic

during five years. The study shows a decided fall in the number of cases of blindness due to trachoma, small pox, and gonorrhea. In prerevolutionary Russia trachoma occupied first place as cause of blindness, small pox fourth, and gonorrhea fifth. The present data place trachoma in the fourth place, small pox seventh and gonorrhea thirteenth. The improvement is due to the social economic shift and raised cultural and sanitary standards. Because of technical efficiency and safety measures the industrialization of the country did not increase the number of cases of blindness caused by injury. At present glaucoma leads the list of causes of blindness.

Ray K. Daily.

Narog, Franciszek. **Types of daltonism and their diagnosis in the railway service.** *Klinika Oczna*, 1936, v. 14, pt. 1, p. 45.

Of 101 color defectives found among railway employees 5 were red-and-green blind, 25 green blind, and 56 red-and-green defectives. The author proposes three categories of color standards for the railway service, patterned after the color requirements of the English marine.

Ray K. Daily.

Pilman, H. **The condition of the ocular segment in workers with synthetic rubber.** *Sovietskii Viestnik Opht.*, 1936, v. 8, pt. 4, p. 618.

With development of this industry the sanitary-hygienic laboratory undertook to study its vocational hazards. The chief detrimental feature is the gases liberated in the atmosphere, which have narcotic qualities and are irritating to mucous membranes. Ocular examination showed prevalence of conjunctivitis. The recommendation is complete hermetization of all machinery.

Ray K. Daily.

**Prenatal and congenital infections in relation to blindness and impaired vision.** Discussion by various speakers. *Sight-Saving Review*, 1935, v. 5, March, pp. 51-69.

Joseph V. Klauder of Philadelphia discussed interstitial keratitis and optic atrophy as the most serious manifestations of syphilis causing blindness. John



L. Rice, Health Commissioner of the city of New York, reported that seventy percent of pregnant women did not report at prenatal clinics for examination until after the fifth month. This he regards as one of the main causes of congenital syphilis, since treatment after this time is of very little value in preventing infection of the child. Max J. Exner of the American Social Hygiene Association expressed the wish that it might be feasible to have a compulsory blood test for every pregnant woman, since such excellent results had been obtained from the law in regard to ophthalmia neonatorum.

Edna M. Reynolds.

Strebel, J. **Diagnosis and significance of anisometropia of artists.** *Klin. M. f. Augenh.*, 1936, v. 96, May, p. 675.

The examination of an artist verified the diagnosis of anisometropia which Strebel had inferred from the peculiarities of the former's drawings. He reports on his studies of the works of other artists. (Illustrations.)

C. Zimmermann.

Vannas, Mauno. **Väinö Grönholm.** *Klin. M. f. Augenh.*, 1936, v. 96, May, p. 683.

An obituary. (Photograph.)

### 19

#### ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Irvine, S. R. **Histology of the extra-ocular muscles.** *Arch. of Ophth.*, 1936, v. 15, May, pp. 847-858.

The literature on the embryology, histology, and innervation of the extra-ocular muscles is reviewed. The histologic peculiarities that distinguish the ocular from other striate muscles are presented. Embryologically in man there is a possibility of splanchnic origin for the ocular muscles. The innervation of the ocular muscles is remarkable for its abundance and for certain peculiar nerve endings, but they contain fewer muscle spindles than other striated muscles. Irvin concludes that from an anatomic point of view the extrinsic ocular neuromuscular system of man is phylogenically earlier than the

striated musculature anywhere else in the body, and that there is relatively little anatomic evidence for ocular proprioceptive sense. J. Hewitt Judd.

Neher, E. M. **The origin of the Brille in *crotalus confluentus lutosus* (Great Basin rattlesnake).** *Trans. Amer. Ophth. Soc.*, 1935, v. 33, pp. 533-545.

Neher discusses the rattlesnake eye and the histologic structure of the "Brille" (or "spectacle"). Embryos obtained from snakes kept in confinement for eleven months were studied and the origin of the Brille determined. The paper does not lend itself to abstract.

C. Allen Dickey.

Polyak, S. **Minute structure of the retina in monkeys and in apes.** *Arch. of Ophth.*, 1936, v. 15, March, pp. 477-519.

The report is based on study of the retina of the adult rhesus monkey and of the chimpanzee by the method of Golgi. Each layer in seven circular subdivisions of the retina is thoroughly described and illustrated by drawings. The author concludes that there is one variety of rods and of cones present throughout all regions of the retina but the morphologic details vary from region to region. Only one variety of horizontal cells was present, although varying greatly in dimensions. Three fundamentally different varieties of bipolar cells and of amacrine cells were found. Six varieties of ganglion cells are described. Müller's fibers were found to form an insulating system open only at the points of synapses, thus indicating that the neurons are independent nerve cells. (Bibliography.)

J. Hewitt Judd.

Reiser, K. A. **Innervation of the human sclera.** *Arch. f. Augenh.*, 1936, v. 109, May, p. 481.

Plexuses of the first and second order are formed in the sclera by nerve fibers of different thickness. Plexuses of the first order have a larger caliber and more medullated nerve fibers than plexuses of the second order. From the larger nerve meshes very fine bundles consisting of 6 to 8 fibrils are sent out which, while anastomosing numerously

among themselves, form a very fine preterminal network. From the latter the diffuse terminal reticulum takes its origin, a syncytial nerve-end formation consisting of numerous small meshes whose fibrils surround and traverse the connective tissue cells. Each nerve fiber is surrounded by a nucleated Schwann's plasm, which loses its identity as the terminal nerve fiber enters the plasm of the end cell. The morphology of the terminal reticulum proves the syncytial construction of the intrascleral nerve system. R. Grunfeld.

Samuels, Bernard. **Recessus hyaloideo-capsularis.** Trans. Ophth. Soc. United Kingdom. 1935, v. 55, p. 507.

The author describes the recessus hyaloideo-capsularis as triangular, the apex resting on the annular ligamentum hyaloideo-capsulare. The sides are bounded by the curved outlines of the capsule anteriorly and of the anterior limiting layer of the vitreous posteriorly, or in general the recessus belongs to that division of the posterior chamber known as the circumlental space. The space was first described by E. Fuchs and was given the above name by A. Fuchs. Pigment was found in the recessus in glaucoma and diabetes. Tumor cells were found in the recessus in a specimen of intraocular sarcoma. The author concludes that extraneous material can be recognized in the recessus if it possesses color.

Beulah Cushman.

Uribe Troncoso, M., and Castroviejo, R. **Microanatomy of the eye with the slitlamp microscope. Comparative anatomy of the angle of the anterior chamber in . . . mammalia.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 371-384; June, pp. 481-492; July, pp. 583-596. (Profusely illustrated.)

Verrier, M. **Studies of the vertebrate retina.** Arch d'Ophth., 1936, v. 53, May, p. 363.

This comparative study does not lend itself to abstracting. Some retinal cells are rods in their inner segment and cones in their outer segment, and the inverse is no less frequent. In the fovea are observed decrease in size and in-

crease in height of the visual cells. Oil droplets are reduced more and more until they become indistinct. Even in the depths of the fovea and at the edge of the depression the receptor elements have the typical rod form. The  $pH$  of the retina of various species is alkaline in some, acid in others.

Derrick Vail.

Vila-Coro, Antonio. **Anatomy of Zinn's ring.** Klin. M. f. Augenh., 1936, v. 36, April, p. 477.

According to his detailed anatomic observations Vila-Coro proposes as a more correct designation for the path between the orbit and interior of the skull "Zinn's fissure" instead of "Zinn's ring." (Illustrations.)

C. Zimmermann.

Vila-Coro, Antonio. **Posterior insertion of the muscles of the orbit.** Klin. M. f. Augenh., 1936, v. 96, April, p. 466.

From his studies of several hundred anatomic specimens the author gives an exact account of the posterior insertion of each muscle of the orbit, correcting erroneous views existing since Zinn's first descriptions. (Illustrations.)

C. Zimmermann.

Vos, T. A. **Embryonic formation of synechia between the rim of the optic vesicle and the lens.** Klin. M. f. Augenh., 1936, v. 96, April, p. 452.

Eight cases of microphthalmos are described with formation of a membrane between lens and ocular walls, consisting of uveal and retinal parts. It was produced by embryonic formation of synechia between the lens and the rim of the ocular cup, on the basis of isolated degeneration of the rim of the optic vesicle. One eye presented a congenital connection between lens and retina. Accessory findings were colobomas, fibrous pseudolens, iris cysts, and circular detachment of the retina with the optic nerve drawn inward. Finally the possibility is mentioned that the presence of a synechia may serve as path for the hyaloid artery, which would explain persistence of this artery in a large number of cases. (Illustrations.)

C. Zimmermann.

# NEWS ITEMS

Edited by Dr. H. Rommel Hildreth  
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News items should reach the editor by the twelfth of the month.

## Deaths

Dr. Archibald Campbell MacLeish, Los Angeles, died May 3, 1936, aged 52 years.

## Miscellaneous

The reorganized department of Ophthalmology, Long Island College of Medicine, has recently established two fellowships. Those interested in medical education will wish to study the plan under which these fellowships are conducted, a statement of which will be presented at a later date.

The Emergency Relief Bureau of the City of New York has selected four ophthalmologists to make eye examinations of special cases coming under its care. It is perhaps significant that special consideration was given men who were able to present the certificate of the American Board for Ophthalmic Examinations.

## Societies

The First European Congress of Structural Surgery will be held at Brussels, Octo-

ber 3 and 4, 1936, under the direction of Dr. Coelst of Brussels, president, and Dr. Pomfret Kilner of London and Professor Savenero-Rosselli of Milan, vice-presidents. The program will be devoted especially to reparative surgery, less emphasis being placed upon esthetic surgery. The complete program will be published shortly. Inquiries should be addressed to Dr. Coelst, President of the Executive Committee, 118 Avenue Louise, Brussels, Belgium.

## Personals

Dr. John Ohly is spending his vacation in the British Isles. He is leaving on July 18th and expects to return to Brooklyn in time for the meeting of the American Academy of Ophthalmology and Otolaryngology.

Dr. Frank Mallon, Assistant Attending Ophthalmologist, Long Island College Hospital, is vacationing in England and the Continent.

Dr. P. Chalmers Jameson gave a very interesting and instructive talk at the Brooklyn Eye and Ear Hospital on the subject of scleral fixation in strabismus, on July 16th.